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COMPUTER CENTER CDC LIBRARIES/NSRDC (SUBPROGRAMS).(U)
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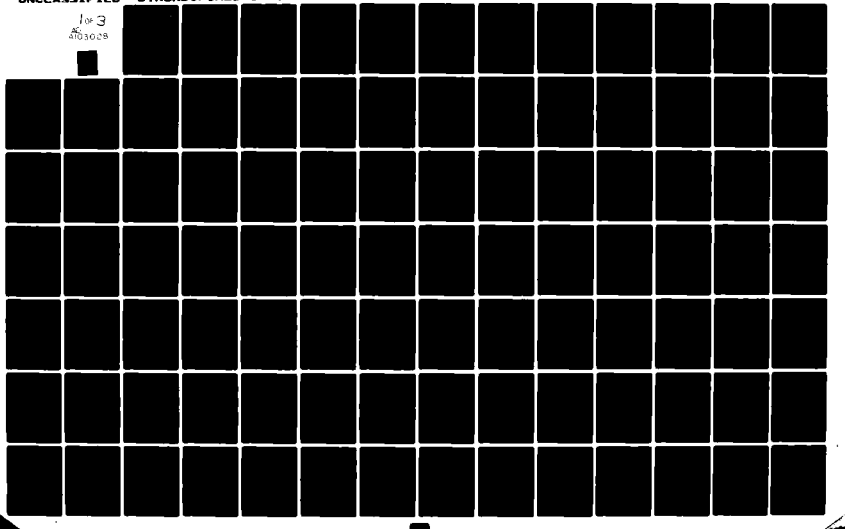

DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER

Bethesda, Maryland 20084

COMPUTER CENTER

CDC LIBRARIES/NSRDC (SUBPROGRAMS)

by

David V. Sommer

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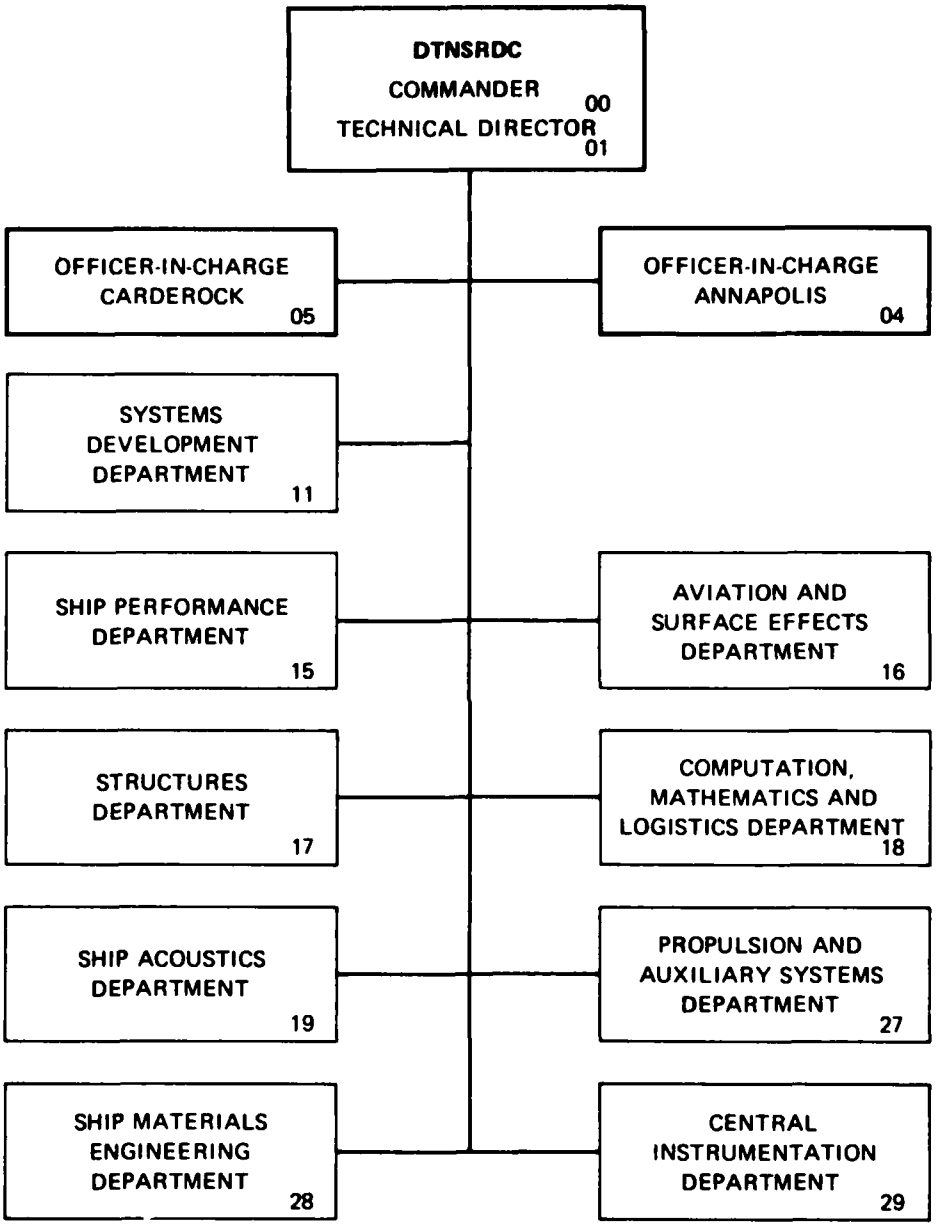
Computation, Mathematics and Logistics Department
Departmental Report

February 1981

MAJOR DTNSRDC ORGANIZATIONAL COMPONENTS



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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
Computer Center CDC Libraries/ NSRDC (Subprograms) CLIB/N, is a reference manual which described most of the subp ograms in library "NSRDC" on the CDC 6000/Cyber 74 computers at DTNSRDC. These scientific and utility routines are used primarily with Fortran (FTN, MNF or RATFOR) programs and most are coded in FTN. CLIB/N lists the routines by functional category and alphabetically with a descriptive title. All currently available machine-readable documents detailing the use of these routines are included.

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COMPUTER CENTER
CDC LIBRARIES / NSRDC
(SUBPROGRAMS)

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USER SERVICES BRANCH
CODE 1892

COMPUTATION, MATHEMATICS AND LOGISTICS DEPARTMENT
DEPARTMENTAL REPORT

FEBRUARY 1981 CMLD-81-07

.. THROUGH REVISION 0 (FEB 1981) ..

TABLE OF CONTENTS

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* - A LISTING OF THE DOCUMENTS IS NOT INCLUDED IN THIS TABLE OF CONTENTS (SEE PAGE 1-9). AS NEW ROUTINES ARE DEVELOPED, THEY WILL BE INSERTED ALPHABETICALLY INTO THIS DOCUMENT AND MAY BE PRINTED ON THE COMPUTER.

***** INTRODUCTION *****

THE COMPUTER CENTER MAKES AVAILABLE ON THE CDC COMPUTERS, IN ADDITION TO THE NOS/BE OPERATING SYSTEM, A WIDE VARIETY OF BOTH SCIENTIFIC AND UTILITY PROGRAMS, SUBPROGRAMS AND CATALOGUED PROCEDURES. MOST OF THE ROUTINES ARE MAINTAINED IN LIBRARIES ON PERMANENT FILES AND MAY BE INVOKED BY THE APPROPRIATE (LOADER) CONTROL CARDS.

THE CLIB-SERIES OF MANUALS CONSISTS OF THE FOLLOWING, WHICH DESCRIBE THE CONTENTS OF THE VARIOUS CDC 6000 LIBRARIES MAINTAINED BY THE COMPUTER CENTER:

CLIB - COMPUTER CENTER CDC LIBRARIES	CMLD-81-06
CLIB/N - COMPUTER CENTER CDC LIBRARIES/NSRDC (SUBPROGRAMS)	CMLD-81-07
CLIB/P - COMPUTER CENTER CDC LIBRARIES/PROCFIL (PROCEDURES)	CMLD-81-08
CLIB/U - COMPUTER CENTER CDC LIBRARIES/UTILITY (PROGRAMS)	CMLD-81-09
CLIB/M - COMPUTER CENTER CDC LIBRARIES/MNSRDC (PROGRAMS)	

THIS MANUAL, CLIB/N, IS A REFERENCE MANUAL WHICH DESCRIBES MOST OF THE SUBPROGRAMS IN LIBRARY 'NSRDC'.

*** HOW TO USE THIS MANUAL ***

THE ROUTINES ARE CLASSIFIED IN ONE OR MORE FUNCTIONAL CATEGORIES (SEE PAGE 1-2 FOR A LIST OF CATEGORIES). THEY ARE LISTED, BEGINNING ON PAGE 1-5, UNDER THE VARIOUS CATEGORIES. THE INDIVIDUAL ROUTINES ARE LISTED, WITH DESCRIPTIVE TITLE, BEGINNING ON PAGE 1-8. CHAPTER 2 CONTAINS ALL CURRENTLY AVAILABLE MACHINE-READABLE DOCUMENTS DESCRIBING THE USE OF SUBPROGRAMS IN LIBRARY 'NSRDC'. DOCUMENTATION NOT IN CHAPTER 2 MAY BE OBTAINED FROM USER SERVICES, CARDEROCK, BLDG 17, ROOM 100, (202) 227-1907.

*** LIBRARY NSRDC ***

'NSRDC' IS A LIBRARY OF DTNSRDC WRITTEN AND/OR SUPPORTED SUBPROGRAMS. THESE ROUTINES ARE USED PRIMARILY WITH FTN, MNF OR RATFOR PROGRAMS AND MOST ARE CODED IN FTN.

*** USING THE LIBRARY ***

THE FOLLOWING CONTROL CARDS MAY BE USED TO ACCESS 'NSRDC' DURING THE LOADING OF A PROGRAM:

```
...
FTN.    -OR-   COBOL.    -OR-   ATTACH,LGO,MYLGO,ID=XXXX.
ATTACH,NSRDC.
LDSET,LIB=NSRDC.         -OR-   LIBRARY,NSRDC.
LGO.
...
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*** FUNCTIONAL CATEGORIES ***

THE FOLLOWING FUNCTIONAL CATEGORIES ARE USED AT DTNSRDC. THOSE CATEGORIES PRECEDED BY AN ASTERISK (*) ARE LOCAL DTNSRDC CATEGORIES. THE OTHER ARE FROM THE VIM (CDC USERS GROUP) LIST.

- A0 ARITHMETIC ROUTINES
- A1 REAL NUMBERS
- A2 COMPLEX NUMBERS
- A3 DECIMAL
- A4 I/O ROUTINES

- B0 ELEMENTARY FUNCTIONS
- B1 TRIGONOMETRIC
- B2 HYPERBOLIC
- B3 EXPONENTIAL AND LOGARITHMIC
- B4 ROOTS AND POWERS

- C0 POLYNOMIALS AND SPECIAL FUNCTIONS
- C1 EVALUATION OF POLYNOMIALS
- C2 ROOTS OF POLYNOMIALS
- C3 EVALUATION OF SPECIAL FUNCTIONS (NON-STATISTICAL)
- C4 SIMULTANEOUS NON-LINEAR ALGEBRAIC EQUATIONS
- C5 SIMULTANEOUS TRANSCENDENTAL EQUATIONS
- * C6 ROOTS OF FUNCTIONS

- D0 OPERATIONS ON FUNCTIONS AND SOLUTIONS OF DIFFERENTIAL EQUATIONS
- D1 NUMERICAL INTEGRATION
- D2 NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS
- D3 NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS
- D4 NUMERICAL DIFFERENTIATION

- E0 INTERPOLATION AND APPROXIMATIONS
- E1 TABLE LOOK-UP AND INTERPOLATION
- E2 CURVE FITTING
- E3 SMOOTHING
- E4 MINIMIZING OR MAXIMIZING A FUNCTION

- F0 OPERATIONS ON MATRICES, VECTORS & SIMULTANEOUS LINEAR EQUATIONS
- F1 VECTOR AND MATRIX OPERATIONS
- F2 EIGENVALUES AND EIGENVECTORS
- F3 DETERMINANTS
- F4 SIMULTANEOUS LINEAR EQUATIONS

- G0 STATISTICAL ANALYSIS AND PROBABILITY
- G1 DATA REDUCTION (COMMON STATISTICAL PARAMETERS)
- G2 CORRELATION AND REGRESSION ANALYSIS
- G3 SEQUENTIAL ANALYSIS
- G4 ANALYSIS OF VARIANCE
- G5 TIME SERIES
- G6 SPECIAL FUNCTIONS (INCLUDES RANDOM NUMBERS AND PDF'S)
- * G7 MULTIVARIATE ANALYSIS AND SCALE STATISTICS
- * G8 NON-PARAMETRIC METHODS AND STATISTICAL TESTS
- * G9 STATISTICAL INFERENCE

H0 OPERATIONS RESEARCH TECHNIQUES, SIMULATION & MANAGEMENT SCIENCE
H1 LINEAR PROGRAMMING
H2 NON-LINEAR PROGRAMMING
H3 TRANSPORTATION AND NETWORK CODES
H4 SIMULATION MODELING
H5 SIMULATION MODELS
H6 CRITICAL PATH PROGRAMS
H8 AUXILIARY PROGRAMS
H9 COMBINED

I0 INPUT
I1 BINARY
I2 OCTAL
I3 DECIMAL
I4 BCD (HOLLERITH)
I9 COMPOSITE

J0 OUTPUT
J1 BINARY
J2 OCTAL
J3 DECIMAL
J4 BCD (HOLLERITH)
J5 PLOTTING
J7 ANALOG
J9 COMPOSITE

K0 INTERNAL INFORMATION TRANSFER
K1 EXTERNAL-TO-EXTERNAL
K2 INTERNAL-TO-INTERNAL (RELOCATION)
K3 DISK
K4 TAPE
K5 DIRECT DATA DEVICES

L0 EXECUTIVE ROUTINES
L1 ASSEMBLY
L2 COMPILING
L3 MONITORING
L4 PREPROCESSING
L5 DISASSEMBLY AND DERELATIVIZING
L6 RELATIVIZING
L7 COMPUTER LANGUAGE TRANSLATORS

M0 DATA HANDLING
M1 SORTING
M2 CONVERSION AND/OR SCALING
M3 MERGING
M4 CHARACTER MANIPULATION
M5 SEARCHING, SEEKING, LOCATING
M6 REPORT GENERATORS
M9 COMPOSITE

N0 DEBUGGING
N1 TRACING AND TRAPPING
N2 DUMPING
N3 MEMORY VERIFICATION AND SEARCHING
N4 BREAKPOINT PRINTING

O0 SIMULATION OF COMPUTERS AND DATA PROCESSORS (INTERPRETERS)
O1 OFF-LINE EQUIPMENT (LISTERS, REPRODUCERS, ETC.)
O3 COMPUTERS
O4 PSEUDO-COMPUTERS
O5 SOFTWARE SIMULATION OF PERIPHERALS
O9 COMPOSITE

P0 DIAGNOSTICS (HARDWARE MALFUNCTION)

Q0 SERVICE OR HOUSEKEEPING, PROGRAMMING AIDS
Q1 CLEAR/RESET
Q2 CHECKSUM ACCUMULATION AND CORRECTION
Q3 REWIND, TAPE MARK, LOAD CARDS, LOAD TAPE PROGRAMS, ETC.
Q4 INTERNAL HOUSEKEEPING, SAVE, RESTORE, ETC.
Q5 REPORT GENERATOR SUBROUTINES
Q6 PROGRAM DOCUMENTATION: FLOW CHARTS, DOCUMENT, STANDARDIZATION
Q7 PROGRAM LIBRARY UTILITIES

R0 LOGIC AND SYMBOLIC
R1 FORMAL LOGIC
R2 SYMBOL MANIPULATION
R3 LIST AND STRING PROCESSING
R4 TEXT EDITING

S0 INFORMATION RETRIEVAL

T0 APPLICATIONS AND APPLICATION-ORIENTED PROGRAMS
T1 PHYSICS (INCLUDING NUCLEAR)
T2 CHEMISTRY
T3 OTHER PHYSICAL SCIENCES (GEOLOGY, ASTRONOMY, ETC.)
T4 ENGINEERING
T5 BUSINESS DATA PROCESSING
T6 MANUFACTURING (NON-DATA) PROCESSING AND PROCESS CONTROL
T7 MATHEMATICS AND APPLIED MATHEMATICS
T8 SOCIAL AND BEHAVIORAL SCIENCES AND PSYCHOLOGY
T9 BIOLOGICAL SCIENCES
T10 REGIONAL SCIENCES (GEOGRAPHY, URBAN PLANNING)
T11 COMPUTER ASSISTED INSTRUCTION

U0 LINGUISTICS AND LANGUAGES

V0 GENERAL PURPOSE UTILITY SUBROUTINES
V1 RANDOM NUMBER GENERATORS
V2 COMBINATORIAL GENERATORS: PERMUTATIONS, COMBINATIONS & SUBSETS
* V3 STANDARD AND SPECIAL PROBLEMS

X0 DATA REDUCTION
X1 RE-FORMATTING, DECOMMUTATION, ERROR DIAGNOSIS
X2 EDITING
X3 CALIBRATION
X4 EVALUATION
X5 ANALYSIS (TIME-SERIES ANALYSIS)
X6 SIMULATION (GENERATE TEST DATA FOR DATA REDUCTION SYSTEM)

Y0 INSTALLATION MODIFICATION
Y1 INSTALLATION MODIFICATION LIBRARY
Y2 NEWPL TAPE OF INSTALLATION MODIFICATIONS

Z0 ALL OTHERS

*** LIST OF SUBPROGRAMS BY CATEGORY ***

THE SUBPROGRAMS IN LIBRARY 'NSRDC' ARE LISTED BELOW UNDER THEIR FUNCTIONAL CATEGORIES. ROUTINES FLAGGED WITH AN ASTERISK (*) DO NOT HAVE MACHINE-READABLE DOCUMENTATION. AN ALPHABETICAL LIST, WITH A BRIEF DESCRIPTION OF EACH ROUTINE BEGINS ON PAGE 1-8.

A0 ARITHMETIC ROUTINES

ICOMN *		

A1 REAL NUMBERS

ISUMIT	NFILL	SUMIT

A2 COMPLEX NUMBERS

CMPINV	HELP	PSI *

B1 TRIGONOMETRIC

COTAN *		

B4 ROOTS AND POWERS

DPROOT	PROOT	

C1 EVALUATION OF POLYNOMIALS

APOWR *	POLDIV *	PROD2 *
BPOWR *	POWR1 *	
HIFAC *	POWR2 *	

C2 ROOTS OF POLYNOMIALS

DPROOT	NROOTS *	QUART *
HELP	PROOT	

C3 EVALUATION OF SPECIAL FUNCTIONS (NON-STATISTICAL)

AI *	CBSF *	EXPINT *
BEJY0 *	CEI3 *	FRESNEL
BEJY1 *	CELLI	GAMCAR
BESSI	COMBES *	GAMMA
BESSJ	ELLI *	LOGGAM *
BESSK	ELLIP *	PSI *
BESSY	ERF *	SNCNDN
BSJ	ERROR *	

C6 ROOTS OF FUNCTIONS

ROOTER *		

D1 NUMERICAL INTEGRATION

FGI *	QUADG	SIMPUN
FNOL3 *	SIMP *	XFIL *

D2 NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS

FNOL3 *	KUTMER

E1 TABLE LOOK-UP AND INTERPOLATION

CRDTAB *	FRMRAN *
DISCOT	FRMRA2 *

E2 CURVE FITTING

FFT	OPLSA	SPLFIT *
FFT5	POLYN	SQFIT *
GMHAS *	RFFT	
LSQSUB *	RFSN	

E3 SMOOTHING

SMOOTH *

E4 MINIMIZING OR MAXIMIZING A FUNCTION

MINMAX *

F1 VECTOR AND MATRIX OPERATIONS

MATINS

F2 EIGENVALUES AND EIGENVECTORS

VARAH1 *	VARAH2 *

F3 DETERMINANTS

GAUSS	MATINS

F4 SIMULTANEOUS LINEAR EQUATIONS

BMAM *	GAUSS	MATINS
CGAUSS	MAM *	
CMPINV	MAM200 *	

G1 DATA REDUCTION (COMMON STATISTICAL PARAMETERS)

STUTEE *

G4 ANALYSIS OF VARIANCE

ANOVA1 *	ANOVA2 *

G6 SPECIAL FUNCTIONS (INCLUDES RANDOM NUMBERS AND PDF'S)

IAOC	IDAYWEK	RANNUM *

I0 INPUT

FASTIN *

I2 OCTAL

OFMTDE	OFMTV

I3 DECIMAL

CRDTAB *

I4 BCD (HOLLERITH)

ICOM *	ICOMN *	IFMTV

J2 OCTAL

PRTFL

J4 BCD (HOLLERITH)

BANR	ICOMN *	PRTIME
BANR6	LINE6	
ICOM *	LINE8	

J5 PLOTTING

PLOTMY *	PLOTPR	PLOTXY *

K2 INTERNAL-TO-INTERNAL (RELOCATION)

GETRA	MOVEIT	SWAP
MFETCH	MSET	
MOVECM	RCPA	

M0 DATA HANDLING

COMPSTR	MASKIT	
EQU60	SWAP	

M1 SORTING

ASORT	QSORT1	SSORTI
ASORTMV	SSORT	SSORTL
QSORT	SSORTF	

M2 CONVERSION AND/OR SCALING

DATCNV	IROMAN	NEWDAT
DATFMT	ISEC	UNHEX3
GETHOUR	JGDATE	WEKDAY
HEX3	JULIAN	
IHMS	MONTH	

M4 CHARACTER MANIPULATION

ADJL	IBUNP	REPLNE
ADJR	IPAKLFT	SBYT
ASHIFT	ISTAPE	SEMICO
CENTER	LBYT	SETREW
CHFILL	LEFTADJ	SHIFTA
CHNGSEQ	MOVCHAR	SKWEZL
CONTRCT	MOVSTR	SKWEZR
EXPAND	MXGET	TRAILBZ
EXPRM	PARGET	VALDAT
EXTBIT	PUTCHA	VFILL
EXTPRM	PUTCHR	ZBLANK
FBINRD	REPLAC	ZEROFL
GETCHA	REPLACM	ZEROS
GETCHR	REPLHI	
GETPRM *	REPLLO	

M5 SEARCHING, SEEKING, LOCATING

AMAXE	GETCHR	LASTWRD
AMINE	GETLIB	MAXE
FINDC	IDIGIT	MINE
FINDW	IFINDCH	NFILLT
FINDWRD	LASTC	NUMVAR
GETCHA	LASTCH	VALIDT

N0 DEBUGGING

ALTIME	ELTIME	PRTIME

N2 DUMPING

DMPA	DUMPA	DUMPFL
DMPCPA	DUMPCPA	RECOVRD

O1 OFF-LINE EQUIPMENT (LISTERS, REPRODUCERS, ETC.)

WARNING

Q0 SERVICE OR HOUSEKEEPING, PROGRAMMING AIDS

AC	GETLIB	NUMEXEC
ALTIME	GODROP	NUMVAR
BANR	HERE	OVLNAME
BANR6	IBL	PFRC
BUFSIZE	IDID	PRTFL
ELTIME	ISITCNF	REDUCE
FTNRFL	JOBNAME	ROUTERC
GETFIT	JOBORG	TIMLEFT
GETLFNS	MEMUSED	ZPFPUT
GETLGO	MFRAME	ZRTPUT

Q3 FILE MANIPULATION

CLUNLD	ROUTE	ZPFUNC
REQUEST	UNLOAD	ZSYSEQ

Q4 INTERNAL HOUSEKEEPING, SAVE, RESTORE, ETC.

PRTIME

R1 FORMAL LOGIC

COUPLE

T4 ENGINEERING

ARDCFT *

V1 RANDOM NUMBER GENERATORS

RANNUM *	RNDMIZ

*** DESCRIPTIVE TITLES ***

SUBPROGRAMS IN LIBRARY 'NSRDC' ARE LISTED ALPHABETICALLY BELOW.

AC	GET ACCOUNT NUMBER FOR THIS JOB
ADJL	LEFT ADJUST A LINE OF WORDS LEAVING ONE SPACE BETWEEN WORDS
ADJR	RIGHT ADJUST A LINE OF WORDS LEAVING ONE SPACE BETWEEN WORDS
AI	AIRY FUNCTION INTEGRAL
ALTIME	OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE START OF JOB (OR INTERCOM SESSION)
AMAXE	FIND MAXIMUM VALUE OF AN ARRAY (ALSO CONTAINS MAXE)
AMINE	FIND MINIMUM VALUE OF AN ARRAY (ALSO CONTAINS MINE)
ANOVA1	ONE-WAY ANALYSIS OF VARIANCE WITH UNEQUAL N
ANOVA2	TWO-WAY ANALYSIS OF VARIANCE WITH EQUAL N
APOWR	EXPONENTIATION OF POWER SERIES - ONE VARIABLE
ARDCFT	PROPERITES OF U.S. STANDARD ATMOSPHERE (1962)
ASHIFT	SHIFT EACH WORD OF AN ARRAY
ASORT	FTN ALPHANUMERIC SORT
ASORTMV	SORT 2-DIMENSIONAL ARRAY USING A FAST ARRAY MOVING SUBROUTINE
BANR	PRINT A BANNER (LETTERS ARE 10 LINES HIGH, LINES ARE 110 CHARACTERS LONG)
BANR6	PRINT A BANNER (LETTERS ARE 6 LINES HIGH, LINES ARE 80 CHARACTERS LONG)
BEJY0	ZERO-ORDER BESSEL FUNCTIONS FOR REAL ARGUMENTS
BEJY1	FIRST ORDER BESSEL FUNCTIONS FOR REAL ARGUMENTS
BESSI	MODIFIED BESSEL FUNCTION OF THE FIRST KIND
BESSJ	BESSEL FUNCTION OF THE FIRST KIND
BESSK	MODIFIED BESSEL FUNCTION OF THE SECOND KIND
BESSY	BESSEL FUNCTION OF THE SECOND KIND

BMAN	SOLVE SYSTEM AX=B FOR BANDED SYMMETRIC MATRICES
BPOWR	EXPONENTIATION OF POWER SERIES IN TWO VARIABLES
BSJ	SPHERICAL BESSEL FUNCTION
BUFSIZE	PRINT MESSAGE IN DAYFILE FOR EACH FILE SPECIFIED INDICATING BUFFER SIZE AND WHETHER BUFFER IS CURRENTLY ALLOCATED
CBSF	COMPLEX BESSEL FUNCTION FOR LARGE ARGUMENT
CCALL	EXIT PROGRAM AND EXECUTE ONE OR MORE CONTROL CARD
CEI3	COMPLETE ELLIPTIC INTEGRAL OF THE THIRD KIND
CELLI	COMPLETE AND INCOMPLETE ELLIPTIC INTEGRALS OF THE FIRST AND SECOND KIND
CENTER	CENTER A CHARACTER STRING WITHIN AN OUTPUT FIELD
CFILL	FILL AREA WITH ALTERNATING FIELDS OF SPECIFIED CHARACTER AND BLANKS
CGAUSS	COMPLEX SOLUTION OF SIMULTANEOUS EQUATIONS AND DETERMINANT BY ITERATIVE GAUSSIAN ELIMINTAION
CHFILL	FILL (PORTION OF) AN ARRAY WITH A CHARACTER
CHNGSEQ	ALLOW COBOL4 USER TO DEFINE A COLLATING SEQUENCE
CLUNLD	CLOSE AND UNLOAD A FILE
CMPINV	COMPLEX MATRIX INVERSION
COMBES	BESSEL FUNCTIONS FOR COMPLEX ARGUMENT AND ORDER
COMPSTR	COMPARE TWO CHARACTER STRINGS
CONTRCT	SQUEEZE ARRAY OF 1R-FORMAT CHARACTERS TO LEFT (SEE EXPAND)
COTAN	COTANGENT FUNCTION
COUPLE	LOGICALLY CONNECT TWO WORDS
CRDTAB	READ TABLES FOR FRMRAN AND FRMRA2 INTERPOLATION
DATCNV	CONVERT DATE FORMATS (USES INTEGERS)
DATFMT	CONVERT DATE FORMATS (USES CHARACTER STRINGS)
DISCOT	SINGLE OR DOUBLE INTERPOLATION
DMP4	CALLABLE OCTAL AND CHARACTER DUMP OF SPECIFIED PORTION OF USER'S FIELD LENGTH (FL) (BY ACTUAL LOCATION) (NO HEADINGS ARE PROVIDED)

DMPCPA	DUMP JOB CONTROL POINT AREA
DPROOT	FIND ALL ROOTS OF A REAL DOUBLE PRECISION POLYNOMIAL
DUMPA	GIVE OCTAL AND CHARACTER DUMP OF USER-SPECIFIED AREA
DUMPCPA	EXPANDED DUMP OF JOB CONTROL POINT AREA
DUMPFL	CALLABLE OCTAL AND CHARACTER DUMP OF SPECIFIED PORTION OF USER'S FIELD LENGTH (FL) (BY ACTUAL LOCATION)
ELLI	ELLIPTIC INTEGRAL
ELLIP	ELLIPTIC INTEGRAL
ELTIME	OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE LAST CALL TO ELTIME
EQU60	LOGICAL COMPARE OF TWO ARRAYS
ERROR	ERROR FUNCTION
EXPAND	EXPAND CHARACTER STRING INTO ARRAY OF 1R-FORMAT WORDS (SEE CONTRCT)
EXPINT	EXPONENTIAL INTEGRAL
EXPRM	EXTRACT NEXT PARAMETER FROM EXECUTE CARD
EXTBIT	EXTRACT BITS FROM A WORD
EXTPRM	EXTRACT NEXT PARAMETER FROM USER-SUPPLIED PARAMETER STRING
FASTIN	READ AND UNPACK DATA PREPARED ON THE XDS-910 A/D CONVERSION SYSTEM
FBINRD	UNPACK AN INPUT ARRAY (N BITS PER INPUT CHARACTER INTO CDC WORD)
FFT	FAST FOURIER TRANSFORM FOR COMPLEX TABULATED FUNCTION
FFT5	FAST FOURIER TRANSFORM
FGI	FORTRAN GAUSSIAN INTEGRATION
FINDC	FIND PRESENCE OR ABSENCE OF SPECIFIED CHARACTER IN AN ARRAY (USER SPECIFIES RELATIONAL OPERAND)
FINDW	FIND PRESENCE OR ABSENCE OF SPECIFIED WORD IN AN ARRAY (USER SPECIFIES RELATIONAL OPERAND)
FINDWRD	FIND SPECIFIED WORD IN AN ARRAY
FNOL3	INTEGRATE SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS

FRESNEL	EVALUATE FRESNEL INTEGRALS
FRMRAN	LINEAR TABLE INTERPOLATION (ONE OR TWO INDEPENDENT VARIABLES)
FRMRA2	LINEAR TABLE INTERPOLATION (MULTIPLE INDEPENDENT VARIABLES)
FTNRFL	GET/SET CORE SIZE
GAMCAR	COMPLEX GAMMA FUNCTION OF A COMPLEX ARGUMENT HAVING POSITIVE REAL PART
GAMMA	INCOMPLETE OR COMPLETE GAMMA FUNCTION
GAUSS	SIMULTANEOUS EQUATION SOLUTION WITH DETERMINANT BY ITERATIVE GAUSSIAN ELIMINATION
GETCHA	EXTRACT CHARACTER FROM SPECIFIED POSITION IN AN ARRAY
GETCHR	EXTRACT CHARACTER FROM SPECIFIED POSITION IN A WORD
GETFIT	GET SPECIFIED FIT ADDRESS
GETHOUR	FOR A SPECIFIED PERIOD OF TIME (UP TO 2 HR 59 MIN 59 SEC) DETERMINE WHICH HOUR IS OCCUPIED THE LONGEST
GETLFNS	GET ACTUAL LOCAL FILE NAMES (FOR FTN)
GETLGO	EXTRACT FIRST 10 CHARACTERS OF ALL EXECUTE CARD PARAMETERS
GETLIB	GET SYSTEM LIBRARY NAME FROM CODE IN CONTROL POINT AREA
GETRA	GET PROGRAM COMMUNICATION REGION (RA+0 THRU RA+77B)
GMHAS	HARMONIC ANALYSIS
GODROP	ISSUE USER-SPECIFIED GO/DROP MESSAGE
HELP	COMPLEX ZEROES OF REAL OR COMPLEX POLYNOMIAL
HERE	GET TERMINAL ID FOR THIS JOB
HEX3	SQUEEZE 3-CHARACTER HEX INTO 12 BITS
HIFAC	HIGHEST COMMON FACTOR OF TWO POLYNOMIALS
IAOC	COUNT ONE-BITS IN SPECIFIED WORD
IBL	CALCULATE BEST BLOCK LENGTH (MIN TIME REQ'D FOR RANDOM ACCESS AND MINIMUM BUFFER SIZE) FOR INDEX SEQUENTIAL FILES
IBUNP	UNPACK 12-BIT BYTES FROM ARRAY

ICOM	INTERACTIVE COMMUNICATOR (SYMBOLIC) -- READ RESPONSE AND COMPARE WITH LIST OF VALID RESPONSES
ICOMN	INTERACTIVE COMMUNICATOR (INTEGER NUMERIC) -- READ NUMBER AND TEST TO SEE IF IN SPECIFIED RANGE
IDAYWEK	FUNCTION TO DETERMINE THE DAY OF THE WEEK FOR ANY DATE FROM 10/15/1582 THRU 02/28/4000
IDID	GET USER INITIALS (AND INTERCOM USER ID) FROM CHARGE CARD OR LOGIN
IDIGIT	CHECK FOR DIGITS IN A FIELD WITHIN A WORD
IFINDCH	FIND FIRST OCCURRENCE OF SPECIFIED CHARACTER IN ARRAY
IFMTV	FAST I-FORMAT DECODE OF VARIABLE LENGTH INPUT
IHMS	CONVERT SECONDS TO ' HH.MM.SS.' (SEE ISEC)
IPAKLFT	SQUEEZE LEFT AND REMOVE ZEROS (00B) AND BLANKS (55B), RETURN NUMBER OF CHARACTERS
IROMAN	CONVERT ROMAN NUMBERS TO INTEGER
ISEC	CONVERT HH.MM.SS TO SECONDS (SEE IHMS)
ISITCNF	TEST FOR CONNECTED FILE
ISTAPE	GENERATE TAPE NAME 'TAPENN'
ISUMIT	SUM ELEMENTS OF INTEGER ARRAY
JGDATE	CONVERT ANY GREGORIAN DATE TO A JULIAN DATE AND VICE VERSA (MULTI-YEAR)
JOBNAME	GET NOS/BE JOB NAME FOR THIS JOB
JOBORG	GET JOB ORIGIN (BATCH, INTERCOM, GRAPHICS, MULTI-USER)
JULIAN	CONVERT ANY GREGORIAN DATE TO A JULIAN DATE AND VICE VERSA (SINGLE YEAR)
KUTMER	INTEGRATE A SYSTEM OF FIRST-ORDER ORDINARY DIFFERENTIAL EQUATIONS USING THE KUTTA-MERSON FOURTH-ORDER, SINGLE-STEP METHOD
LASTCH	FIND LAST NON-BLANK CHARACTER IN ARRAY
LASTWRD	FIND LAST WORD OF ARRAY WHICH CONTAINS A NON-BLANK CONTAINS A NON-BLANK
LBYT	EXTRACT VARIABLE LENGTH BYTE

LEFTADJ	SQUEEZE LEFT AND REMOVE BLANKS AND 00B (USER MAY SUPPLY TRAILING FILL CHARACTER)
LINE6	SET PRINT FILE TO 6 LINES PER INCH
LINE8	SET PRINT FILE TO 8 LINES PER INCH
LOGGAM	LOGARITHM OF GAMMA FUNCTION FOR COMPLEX ARGUMENT
LSQSUB	GENERAL WEIGHTED LEAST SQUARES FIT
MAM	SOLVE SYMMETRIC SYSTEM OF LINEAR EQUATIONS
MAM200	SOLVE 200 SYMMETRIC LINEAR EQUATIONS
MASKIT	DYNAMIC MASK GENERATOR
MATINS	MATRIX INVERSE WITH SIMULTANEOUS EQUATION SOLUTION AND DETERMINANT
MAXE	FIND MAXIMUM VALUE OF AN ARRAY (ALSO CONTAINS AMAXE)
MEMUSED	PRINT MESSAGE IN DAYFILE GIVING FIELD LENGTH IN USE AT TIME OF CALL TO THIS ROUTINE
MFETCH	FETCH A SINGLE WORD FROM USER'S FL (SEE MSET)
MFRAME	OBTAIN THE MACHINE AND MAINFRAME RUNNING THE PROGRAM
MINE	FIND MINIMUM VALUE OF AN ARRAY (ALSO CONTAINS AMINE)
MINMAX	GENERALIZED NONLINEAR ITERATOR
MONTH	FROM A DATE (MM/DD/YY) FIND THE MONTH AND RETURN FULL SPELLING AND 3- OR 4-CHARACTER ABBREVIATION
MOVCHAR	MOVE ONE CHARACTER FROM ONE STRING TO ANOTHER
MOVECM	MOVE WORDS FROM ONE AREA IN CORE TO ANOTHER
MOVEIT	MOVE AN ARRAY (MOVLEV REPLACEMENT WHICH CALLS MOVECM)
MOVSTR	MOVE A STRING OF CHARACTERS FROM ONE ARRAY TO ANOTHER
MSET	SET A SINGLE WORD IN USER'S FL (SEE MFETCH)
MXGET	EXTRACT (RIGHT-JUSTIFIED, ZERO-FILLED) 0-10 6-BIT CHARACTERS FROM 60-BIT WORDS
NEWDAT	ADD/SUBTRACT SPECIFIED NUMBER OF DAYS TO/FROM A GIVEN DATE
NFILL	FILL ELEMENTS 1 THRU N OF AN ARRAY WITH THE VALUES 1 THRU N, RESPECTIVELY
NFILLT	TEST AN ARRAY FOR THE PRESENCE OF THE INTEGERS 1 THRU N IN ELEMENTS 1 THRU N, RESPECTIVELY

NROOTS	REAL AND COMPLEX ROOTS OF REAL POLYNOMIAL
NUMEXEC	GET NUMBER OF EXECUTE CARD PARAMETERS WHICH WERE USED IN THIS EXECUTION OF THE PROGRAM
NUMVAR	DETERMINE NUMBER OF ARGUMENTS IN CALL TO SUBPROGRAM
OFMTDE	FAST O-FORMAT DECODE
OFMTV	FAST O-FORMAT DECODE OF VARIABLE LENGTH INPUT
OPLSA	ORTHOGONAL POLYNOMIAL LEAST SQUARE APPROXIMATION
OVLNAME	GET NAME OF FILE CURRENTLY BEING EXECUTED
PARGET	GET ALL PARAMETERS OF USER-SUPPLIED PARAMETER STRING
PFRC	SUPPLY DESCRIPTION OF PERMANENT FILE FUNCTION RETURN CODE
PLOTMY	PRINTER PLOT - MULTIPLE CURVES
PLOTPR	PRINTER PLOT - MULTIPLE CURVES
PLOTXY	PRINTER PLOT - SINGLE CURVE
POLDIV	POLYNOMIAL DIVISION
POLYN	LEAST SQUARES POLYNOMIAL FIT
POWR1	1 TERM IN EXPONENTIATION OF POWER SERIES - ONE VARIABLE
POWR2	1 TERM IN EXPONENTIATION OF POWER SERIES - TWO VARIABLES
PROD2	1 TERM IN PRODUCT OF POWER SERIES - TWO VARIABLES
PROOT	FIND ALL ROOTS OF A REAL PLOYNOMIAL
PRTFL	PRINT CURRENT FL (OR PUT INTO DAYFILE)
PRTIME	GET AND PRINT CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE LAST CALL AND PRINT USER-SUPPLIED MESSAGE
PSI	COMPLEX PSI FUNCTION
PUTCHA	INSERT CHARACTER INTO SPECIFIED POSITION IN AN ARRAY
PUTCHR	INSERT CHARACTER INTO SPECIFIED POSITION IN A WORD
QSORT	IN-CORE ASCENDING SORT FOR ARRAYS LARGER THAN 500 WORDS
QSORT1	IN-CORE ASCENDING SORT WITH RE-ORDERING OF ASSOCIATED ARRAY (FOR ARRAYS LARGER THAN 500 WORDS)
QUADG	INTEGRAL BY GAUSS-LEGENDRE 10-POINT QUADRATURE
QUART	REAL OR COMPLEX ROOTS OF QUARTIC

RANNUM	NORMALLY DISTRIBUTED RANDOM NUMBERS
RCPA	READ (A PORTION OF) CONTROL POINT AREA
RECOVRD	ON RECOVERY, PRINT EXCHANGE JUMP PACKAGE, RA+0 THRU RA+77B
REDUCE	REDUCE FL TO MINIMUM -OR- REQUEST ADDITIONAL FL RELATIVE TO START OF BLANK COMMON
REPLAC	REPLACE ONE CHARACTER WITH ANOTHER IN AN ARRAY
REPLACM	REPLACE SEVERAL CHARACTERS WITH OTHER CHARACTERS
REPLHI	REPLACE ALL CHARACTERS GREATER THAN SPECIFIED CHARACTER WITH NEW CHARACTER
REPLLO	REPLACE ALL CHARACTERS LESS THAN SPECIFIED CHARACTER WITH NEW CHARACTER
REPLNE	REPLACE ALL CHARACTERS (EXCEPT SPECIFIED CHARACTER) WITH A SPECIFIED CHARACTER
REQUEST	CALLABLE REQUEST COMMAND
RFFT	FAST FOURIER TRANSFORM FOR REAL TABULATED DATA
RFSN	REVERSE FAST FOURIER TRANSFORM
RNDMIZ	EMULATE BASIC LANGUAGE 'RANDOMIZE' STATEMENT (CAN BE USED TO GUARANTEE FIRST CALL TO RANF WILL RESULT IN A DIFFERENT NUMBER WITH EACH EXECUTION OF A PROGRAM)
ROOTER	GENERAL ROOT FINDER
ROUTE	CALLABLE ROUTE COMMAND
ROUTERC	SUPPLY DESCRIPTION OF ROUTE RETURN CODE
SBYT	STORE VARIABLE LENGTH BYTE
SEMICO	REPLACE DISPLAY CODE 00B WITH 77B (SEMI-COLON)
SETREW	CONVERT ALPHABETIC REWIND OPTION INTO RM OPEN AND CLOSE CODES
SHIFTA	SHIFT ARRAY A SPECIFIED NUMBER OF BITS (CROSSING OVER WORD BOUNDARIES)
SIMP	SIMPSON'S RULE INTEGRATION
SIMPUN	SIMPSON'S RULE INTEGRATION - UNEQUAL INTERVALS
SKWEZL	SQUEEZE LEFT AND REMOVE BLANKS AND 00B
SKWEZR	SQUEEZE RIGHT AND REMOVE BLANKS AND 00B

SMOOTH	LEAST SQUARES POLYNOMIAL SMOOTHING
SNCNDN	JACOBIAN ELLIPTIC FUNCTION
SPLFIT	SPLINE CURVE FIT
SQFIT	POLYNOMIAL LEAST SQUARE FIT
SSORT	FTN SHELL SORT
SSORTF	FTN CALLABLE SHELL SORT FOR TWO-DIMENSIONAL ARRAYS
SSORTI	FTN CALLABLE SHELL SORT FOR TWO-DIMENSIONAL ARRAYS
SSORTL	FTN LOGICAL SHELL SORT
STUTEE	STUDENT'S T DISTRIBUTION
SUMIT	SUM ELEMENTS OF REAL ARRAY
SWAP	SWAP TWO ARRAYS
TIMLEFT	DETERMINE CP (AND IO) TIME LEFT SINCE START OF BATCH JOB OR INTERCOM COMMAND
TRAILBZ	CHANGE TRAILING BLANKS TO ZEROS (00B)
UNHEX3	SPREAD 2 CHARACTERS INTO 3 HEX DIGITS
UNLOAD	UNLOAD A FORTRAN FILE
VALDAT	LOGICAL FUNCTION TO VALIDATE A DATE FORMAT
VALIDT	VALIDATE AN ARRAY TO SEE THAT EACH ELEMENT IS ONE OF A USER-SPECIFIED LIST
VARAH	EIGENVALUES AND EIGENVECTORS OF A GENERAL REAL MATRIX
VARAH2	IMPROVED ESTIMATES AND BOUNDS FOR EIGENSYSTEM OF A GENERAL REAL MATRIX
VFILL	FILL AN ARRAY WITH USER-SPECIFIED WORD
WARNING	FTN-CALLABLE 'WARNING' CONTROL CARD
WEKDAY	DETERMINE THE DAY OF THE WEEK FOR ANY GREGORIAN DATE FROM OCTOBER 15, 1582 THRU FEBRUARY 28, 4000
XFIL	FILON'S METHOD FOR INTEGRALS WITH SIN AND COS
ZBLANK	CHANGE BLANKS TO 00B AND VICE VERSA
ZEROFL	ZERO FIELD LENGTH (SECURITY EOJ)
ZEROS	REPLACE BLANKS WITH (DISPLAY CODE) ZEROS, MULTIPLE FIELDS

ZPFPUT	PUT USER-SPECIFIED PARAMETERS INTO ARRAY FOR LATER CALL TO ZPFUNC
ZPFUNC	CALLABLE PERMANENT FILE FUNCTIONS
ZRTPUT	PUT USER-SPECIFIED PARAMETERS INTO ARRAY FOR LATER CALL TO ROUTE
ZSYSEQ	FORTRAN CALLABLE SYSTEM CALL

***** SUBPROGRAM DOCUMENTATION *****

THIS CHAPTER CONTAINS THE MACHINE-READABLE DOCUMENTATION FOR MANY SUBPROGRAMS IN LIBRARY 'NSRDC'. NON-MACHINE-READABLE DOCUMENTATION FOR OTHER ROUTINES IN THE LIBRARY IS ON FILE IN USER SERVICES, CODE 1892.1, (202) 227-1907.

*** HOW TO PRINT A DOCUMENT ***

INDIVIDUAL DOCUMENTS MAY BE PRINTED USING:

```
BEGIN.DOCGET,,NSRDC,,<SUBPROG>,OUTPUT.
```

WHERE <SUBPROG> IS THE DESIRED DOCUMENT.

SEVERAL DOCUMENTS MAY BE PRINTED AT ONE TIME USING:

```
JOBNAME.
CHARGE,....
BEGIN,UTILITY,,MANYDOC,NSRDC.
'   7/8/9      EOR
<SUBPROG1>
<SUBPROG2>
   ...
<SUBPROGN>
"   6/7/8/9    EOI
```

```
SUBROUTINE 'AC'
FUNCTION   'AC'

PURPOSE
   GET ACCOUNT NUMBER FOR THIS JOB

FUNCTIONAL CATEGORIES:  Q0

USAGE
   CALL AC (I)
   IVARIABLE = AC (I)

DESCRIPTION OF PARAMETERS
   AC - WILL CONTAIN ACCOUNT NUMBER
        (INTEGER TYPE VARIABLE)
   I  - WILL ALSO CONTAIN ACCOUNT NUMBER

REMARKS
   'AC' MUST BE DECLARED INTEGER IN THE CALLING ROUTINE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      RCPA     - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
   L71FMT  - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

METHOD
   THE ACCOUNT NUMBER IS TAKEN FROM CONTROL POINT AREA.

CM REQUIRED: 378

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/04/75

DATE(S) REVISED
   02/27/76

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'ADJL'

PURPOSE
LEFT ADJUST A LINE OF WORDS LEAVING ONE SPACE BETWEEN WORDS

FUNCTIONAL CATEGORIES: M4

USAGE
CALL ADJL (A, NA, NC, NW, NWORDS)

DESCRIPTION OF PARAMETERS
A - ARRAY CONTAINING WORDS TO BE LEFT-ADJUSTED
(WILL BE REPLACED BY LEFT-ADJUSTED ARRAY)
NA - NUMBER OF COMPUTER WORDS IN 'A' (DIMENSION OF 'A')
NC - OUTPUT NUMBER OF CHARACTERS
NW - OUTPUT NUMBER OF COMPUTER WORDS
(SUBSCRIPT OF LAST NON-BLANK WORD IN 'A')
NWORDS - OUTPUT NUMBER OF WORDS IN LINE

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
GETCHA - GET CHARACTER FROM ARRAY
PUTCHA - PUT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 147B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/24/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ADJR'

PURPOSE
RIGHT ADJUST A LINE OF WORDS LEAVING ONE SPACE BETWEEN WORDS

FUNCTIONAL CATEGORIES: M4

USAGE
CALL ADJR (A, NA, NC, NW, NWORDS)

DESCRIPTION OF PARAMETERS
A - ARRAY CONTAINING WORDS TO BE RIGHT-ADJUSTED
(WILL BE REPLACED BY RIGHT-ADJUSTED ARRAY)
NA - NUMBER OF COMPUTER WORDS IN 'A' (DIMENSION OF 'A')
NC - OUTPUT POSITION OF FIRST NON-BLANK CHARACTER
NW - OUTPUT SUBSCRIPT OF FIRST NON-BLANK WORD IN 'A'
NWORDS - OUTPUT NUMBER OF WORDS IN LINE

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
GETCHA - GET CHARACTER FROM ARRAY
PUTCHA - PUT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 157B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/24/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ALTIME'

PURPOSE
   OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE
   START OF JOB (OR INTERCOM SESSION)

FUNCTIONAL CATEGORIES: Q0 N0

USAGE
   CALL ALTIME (TIMES)

DESCRIPTION OF PARAMETER
   TIMES - 7-WORD ARRAY TO CONTAIN THE FOLLOWING:
           1 - CPA TIME IN SECONDS
           2 - CPB TIME IN SECONDS
           3 - CP TIME IN SECONDS (CPA+CPB)
           4 - PP TIME IN SECONDS
           5 - IO TIME IN SECONDS
           6 - WALL CLOCK TIME (HH.MM.SS.)
           7 - WALL CLOCK TIME IN SECONDS

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      ISEC   - CONVERT HH.MM.SS TO SECONDS
      RCPA   - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
   R65FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 60B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/15/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ASHIFT'

PURPOSE
   SHIFT EACH INDIVIDUAL WORD OF AN ARRAY

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   SEE 'SHIFTA' TO SHIFT AN ENTIRE ARRAY.

USAGE
   CALL ASHIFT (A, NA, NABITS)

DESCRIPTION OF PARAMETERS
   A   - ARRAY, EACH WORD OF WHICH IS TO BE SHIFTED
   NA   - NUMBER OF WORDS IN 'A' TO BE SHIFTED
   NABITS - NUMBER OF BITS TO SHIFT EACH WORD
             POSITIVE -- SHIFT LEFT CIRCULAR
             NEGATIVE -- SHIFT RIGHT WITH SIGN PROPAGATION

CM REQUIRED: 17B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 1973

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ASORT'

PURPOSE
FTN ALPHANUMERIC SORT

FUNCTIONAL CATEGORIES: M1

USAGE
```
CALL ASORT (A, I, L, TEM, PT, COL, KEY, TRANA, KEYM)
CALL ASORT (A, I, L, TEM, PT, COL, KEY,     0, KEYM)
CALL ASORT (A, I, L, TEM, PT, COL, KE   TRANA)
CALL ASORT (A, I, L, TEM, PT, COL, KEY)
CALL ASORT (A, I, L, TEM, PT, COL)
```

DESCRIPTION OF PARAMETERS

A	- TWO-DIMENSIONAL ARRAY TO BE SORTED
I	- NUMBER OF COLUMNS (LINES) TO BE SORTED
L	- NUMBER OF ROWS (LENGTH OF LINE) PER COLUMN
TEM	- TEMPORARY WORK ARRAY OF DIMENSION 'I'
PT	- TEMPORARY WORK ARRAY OF DIMENSION 'I'
COL	- TEMPORARY WORK ARRAY OF LENGTH 'L'
KEY	- IF PRESENT, IS ARRAY OF LENGTH 'L' LISTING THE SORT KEYS: KEY(1)=5 IMPLIES THAT THE PRIMARY SORT KEY IS ROW 5 KEY(2)=7 " " " SECONDARY " " " ROW 7 ... KEY(N)=M " " " N-TH " " " ROW M KEY(N)=0 IMPLIES THAT THE SORT ENDS AFTER N-1 SORT KEYS ARE USED
TRANA	- IF PRESENT, I 63-WORD ARRAY DEFINING THE COLLATING SEQUENCE. IF ABSENT OR 0, DISPLAY CODE VALUES ARE USED. IF 0, KEYM CAN BE USED WITHOUT CHANGING THE COLLATING SEQUENCE.
KEYM	- IF PRESENT, IS AN ARRAY OF LENGTH 'L' FURTHER DEFINING THE SORT KEYS. (E.G., KEYM(2) IS A MASK DEFINING WHAT BITS OF THE SECONDARY SORT KEY WILL BE USED.)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
IABS LOCF SHIFT
OTHERS
EQU60
SENT
SSORTL

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 4746

AUTHOR
C FLINK - KPS - NWL

DATE WRITTEN: 03/08/71

DATE(S) REVISED
06/23/72 - C FLINK

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ASORTMV'

PURPOSE
SORT AN ARRAY TAKING ADVANTAGE OF A FAST ARRAY MOVE

FUNCTIONAL CATEGORIES: M1

LANGUAGE: FORTRAN IV

COMPUTER
CDC 6000

REMARKS
IN ORDER TO USE 'MOVECM', ALL RELATED DATA TO BE SWAPPED MUST BE PHYSICALLY LOCATED NEXT TO EACH OTHER, THAT IS, EACH ROW OF 'A' CONTAINS RELATED DATA.

USAGE
CALL ASORTMV (A, NROW, NCOL, IROW, UPDOWN, TEMP, SWAP)

DESCRIPTION OF PARAMETERS

A	-	2-DIMENSIONAL ARRAY TO BE SORTED
NROW	-	NUMBER OF ROWS IN ARRAY 'A' (FIRST DIMENSION)
NCOL	-	NUMBER OF COLUMNS IN ARRAY 'A' (SECOND DIMENSION)
IROW	-	ROW POSITION TO BE SORTED
UPDOWN	-	SORT ORDER DESIRED
		1LA - ASCENDING SORT
		1LD - DESCENDING SORT
TEMP	-	WORK ARRAY OF DIMENSION 'NROW' OR GREATER
SWAP	-	RETURN CODE
		0 - NO SWAPPING WAS NECESSARY (ARRAY ALREADY IN ORDER)
		1 - AT LEAST 1 SWAP WAS NECESSARY
		2 - UPDOWN INVALID, ASCENDING SORT ASSUMED, NO SWAPPING WAS NECESSARY
		3 - UPDOWN INVALID, ASCENDING SORT ASSUMED, AT LEAST 1 SWAP WAS NECESSARY
		4 - IROW <= 0
		5 - IROW > NROW

CM REQUIRED: 233B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      MOVECM - MOVE AN ARRAY

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 02/01/75

DATE(S) REVISED
   02/21/80 - CHANGE 'MOVLEV' TO 'MOVECM'

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'BANR'

PURPOSE
PRINT A BANNER (LETTERS ARE 10 LINES HIGH, LINES ARE 110 CHARACTERS LONG)

FUNCTIONAL CATEGORIES: J4

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
UPPER CASE ONLY (A-Z 0-9 + - * / ( ) $ = SPACE , . #
¢ ! : " _ | & ' ? < > @ \ ¬ ;)

EACH BANNER REQUIRED 14 LINES (4 BLANKS, 10 FOR THE BANNER). THUS, 3 BANNERS WILL FIT ON A PAGE AT 6 LINES PER INCH; 5 AT 8 LPI.

UP TO 10 CHARACTERS MAY APPEAR IN A BANNER. THE LINES ARE 110 CHARACTERS LONG.

SEE SUBROUTINE 'BANR6'.

USAGE
CALL BANR (BANNER, IFILE, NEWPAG)

DESCRIPTION OF PARAMETERS
BANNER - 1-10 CHARACTERS TO BE PRINTED
(B7700 : 2-WORD REAL ARRAY;
CDC 6000: SINGLE WORD OR ARRAY ELEMENT)
IFILE - NUMBER OF FILE ON WHICH BANNER IS TO BE WRITTEN
NEWPAG - ONE OF:
ZERO - BANNER IS WRITTEN ON NEW PAGE
NON-ZERO - BANNER IS WRITTEN ON SAME PAGE

CM REQUIRED: B7700: EST 1715 WORDS; CDC 6000: 1540B

OUTPUT UNITS

UNIT #	LFN/INT	USE
USER SPECIFIES		LISTABLE OUTPUT

EXAMPLES
PRINT THE BANNER 'HYSTERICAL' AT THE TOP OF THE NEXT PAGE ON THE PRINTER FILE:

```
B7700   : REAL HYS(2)/ "HYSTERICAL"/
          CALL BANR (HYS, 6, 0)
CDC 6000: CALL BANR ("HYSTERICAL", 6LOUTPUT, 0)
```

PRINT THE BANNER '10/19/77' ON THE SAME PAGE ON FILE 9:

```
B7700   : REAL DAT(2)/ "10/19/77"/
          CALL BANR (DAT, 9, 2)
CDC 6000: CALL BANR (8H10/19/77, 9, 1)
```

```
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      B7700
         NONE
      CDC 6000
         SHIFT
   OTHERS
      B7700
         FOLDIT - FOLD LOWER CASE TO UPPER CASE
         SCANCH - CHARACTER SCAN
      CDC 6000
         VFILL  - FILL ARRAY WITH WORD

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 02/18/75

DATE(S) REVISED
   79/07/16 - RE-WRITTEN FOR B7700
   81/01/15 - CDC VERSION UPGRADED TO NOS/BE LEVEL 461

LOCATION OF DECKS
   SOURCE
      B7700    :   *SOURCE/NSRDC/BANR
      CDC 6000:   UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      B7700    :   *NSRDC/BANR
      CDC 6000:   EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'BANR6'

PURPOSE
PRINT A BANNER (LETTERS ARE 6 LINES HIGH, LINES ARE 80 CHARACTERS LONG)

FUNCTIONAL CATEGORIES: J4

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
UPPER CASE ONLY (A-Z 0-9 + - * / ( ) $ = SPACE , . #
¢ ! : " _ | & ' ? < > @ \ ¬ ;)

EACH BANNER REQUIRED 10 LINES (4 BLANKS, 6 FOR THE BANNER). THUS, 6 BANNERS WILL FIT ON A PAGE AT 6 LINES PER INCH: *8 AT 8 LPI*.

UP TO 10 CHARACTERS MAY APPEAR IN A BANNER. THE LINES ARE 80 CHARACTERS LONG.

SEE SUBROUTINE 'BANR'.

USAGE
CALL BANR6 (BANNER, IFILE, NEWPAG)

DESCRIPTION OF PARAMETERS
BANNER - 1-10 CHARACTERS TO BE PRINTED
(B7700 : 2-WORD REAL ARRAY;
CDC 6000: SINGLE WORD OR ARRAY ELEMENT)
IFILE - NUMBER OF FILE ON WHICH BANNER IS TO BE WRITTEN
NEWPAG - ONE OF:
ZERO - BANNER IS WRITTEN ON NEW PAGE
NON-ZERO - BANNER IS WRITTEN ON SAME PAGE

CM REQUIRED: B7700: EST 1103 WORDS; CDC 6000: 1046B

OUTPUT UNITS

UNIT #	LFN/INT	USE
USER SPECIFIES		LISTABLE OUTPUT

EXAMPLES
PRINT THE BANNER 'HYSTERICAL' AT THE TOP OF THE NEXT PAGE ON THE PRINTER FILE:

```
B7700   : REAL HYS(2)/ "HYSTERICAL"/
          CALL BANR6 (HYS, 6, 0)
CDC 6000: CALL BANR6 ("HYSTERICAL", 6LOUTPUT, 0)
```

PRINT THE BANNER '10/19/77' ON THE SAME PAGE ON FILE 9:

```
B7700   : REAL DAT(2)/ "10/19/77"/
          CALL BANR6 (DAT, 9, 2)
CDC 6000: CALL BANR6 (8H10/19/77, 9, 1)
```

```
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      B7700
         NONE
      CDC 6000
         MOVLEV    SHIFT
   OTHERS
      B7700
         FOLDIT - FOLD LOWER CASE TO UPPER CASE
         SCANCH - CHARACTER SCAN
      CDC 6000
         NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/18/77

DATE(S) REVISED
   79/07/16 - RE-WRITTEN FOR B7700

LOCATION OF DECKS
   SOURCE
      B7700    :   *SOURCE/NSRDC/BANR6
      CDC 6000:   UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      B7700    :   *NSRDC/BANR6
      CDC 6000:   EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'BESSI'

PURPOSE
MODIFIED BESSEL FUNCTION OF THE FIRST KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
FOR N=0, I(NU) AND I(NU+1) ARE ALWAYS COMPUTED.

IF K-BESSEL FUNCTION IS ALSO REQUIRED, USE SUBROUTINE BESSK TO OBTAIN I- AND K-BESSEL FUNCTIONS.

USAGE
CALL BESSI (X, FNU, N, VI)

DESCRIPTION OF PARAMETERS
X - THE ARGUMENT (X > 0.0)
FNU - NU, THE FRACTIONAL PART OF THE ORDER (0. $\leq$ FNU $\leq$ 1.)
N - HIGHEST ORDER IS (N+FNU)
ABS(N)+1 TABLE ENTRIES ARE TO BE COMPUTED
VI - ARRAY TO CONTAIN THE COMPUTED TABLE
(DIMENSION MUST BE AT LEAST: MAX(N+13,X+28), THE REST OF THE ARRAY IS WORK AREA)
VI(1) = (E**(-X)) IO(X), WHERE IO IS I(0+FNU)
ETC.

CM REQUIRED: 715B

METHOD
SEE "RECURRENCE TECHNIQUES FOR THE CALCULATION OF BESSEL FUNCTIONS", M. GOLDSTEIN AND R. THALER, MTAC, VOL. XIII, NO. 66, APRIL 1959.

FOR X $\geq$ 10.0, ASYMPTOTIC VALUES ARE COMPUTED USING THE SO-CALLED PHASE AMPLITUDE METHOD. SEE "BESSEL FUNCTIONS FOR LARGE ARGUMENTS", M. GOLDSTEIN AND R. THALER, MTAC, VOL XII, NO. 61, JANUARY 1958.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS EXP IABS MAX0 SQRT
OTHERS
GAMMA

AUTHORS
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NEW YORK UNIVERSITY

VIM ROUTINE NYUBESS

DATE WRITTEN: BEFORE 11/65

DATE(S) REVISED
11/65 - HA
09/01/67 - MF

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK ?)

OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'BESSJ'

PURPOSE
BESSEL FUNCTION OF THE FIRST KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
FOR N=0, J(NU) AND J(NU+1) ARE ALWAYS COMPUTED.

IF Y-BESSEL FUNCTION IS ALSO REQUIRED, USE SUBROUTINE BESSY TO OBTAIN J- AND Y-BESSEL FUNCTIONS.

USAGE
CALL BESSJ (X, FNU, N, VJ)

DESCRIPTION OF PARAMETERS
X - THE ARGUMENT (X > 0.0)
FNU - NU, THE FRACTIONAL PART OF THE ORDER (0. $\leq$ FNU $\leq$ 1.)
N - HIGHEST ORDER IS (N+FNU)
ABS(N)+1 TABLE ENTRIES ARE TO BE COMPUTED
VJ - ARRAY TO CONTAIN THE COMPUTED TABLE
(DIMENSION MUST BE AT LEAST: MAX(N+13,X+28), THE REST OF THE ARRAY IS WORK AREA)
VJ(1) = J0(X), WHERE J0 IS J(0+FNU)
ETC.

CM REQUIRED: 701B

METHOD
SEE "RECURRENCE TECHNIQUES FOR THE CALCULATION OF BESSEL FUNCTIONS", M. GOLDSTEIN AND R. THALER, MTAC, VOL. XIII, NO. 66, APRIL 1959.

FOR X $\geq$ 10.0, ASYMPTOTIC VALUES ARE COMPUTED USING THE SO-CALLED PHASE AMPLITUDE METHOD. SEE "BESSEL FUNCTIONS FOR LARGE ARGUMENTS", M. GOLDSTEIN AND R. THALER, MTAC, VOL XII, NO. 61, JANUARY 1958.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS COS IABS MAXO SIN
SQRT
OTHERS
GAMMA

AUTHORS
FLORENCE F. RAGUSA AND M. GOLDSTEIN
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MARGARET FRANTZ
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VIM ROUTINE NYUBESS

DATE WRITTEN: BEFORE 11/65

DATE(S) REVISED
11/65 - HA
09/01/67 - MF

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK ?)
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'BESSK'

PURPOSE
BESSEL FUNCTION OF THE SECOND KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
FOR N=0, I(NU) AND I(NU+1) ARE ALWAYS COMPUTED.

THIS SUBROUTINE ALSO COMPUTED THE I-BESSEL FUNCTION.

USAGE
CALL BESSK (X, FNU, N, VI, VK)

DESCRIPTION OF PARAMETERS
X - THE ARGUMENT (X > 0.0)
FNU - NU, THE FRACTIONAL PART OF THE ORDER (0. ≤ FNU ≤ 1.)
N - HIGHEST ORDER IS (N+FNU)
ABS(N)+1 TABLE ENTRIES ARE TO BE COMPUTED
VI - ARRAY TO CONTAIN THE COMPUTED TABLE
(DIMENSION MUST BE AT LEAST: MAX(N+13,X+28), THE
REST OF THE ARRAY IS WORK AREA)
VI(1) = (E**(-X)) I0(X), WHERE I0 IS I(0+FNU)
ETC.
VK - ARRAY TO CONTAIN THE COMPUTED K-TABLE
(DIMENSION MUST BE AT LEAST: MAX(N+13,X+28), THE
REST OF THE ARRAY IS WORK AREA)
VK(1) = (E**(X)) I0(X), WHERE I0 IS I(0+FNU)
ETC.

CM REQUIRED: 530B

METHOD
SEE "RECURRENCE TECHNIQUES FOR THE CALCULATION OF BESSEL FUNCTIONS", M. GOLDSTEIN AND R. THALER, MTAC, VOL. XIII, NO. 66, APRIL 1959.

FOR X ≥ 10.0, ASYMPTOTIC VALUES ARE COMPUTED USING THE SO-CALLED PHASE AMPLITUDE METHOD. SEE "BESSEL FUNCTIONS FOR LARGE ARGUMENTS", M. GOLDSTEIN AND R. THALER, MTAC, VOL XII, NO. 61, JANUARY 1958.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ALOG EXP IABS MAX0 SIN
OTHERS
BESSI
GAMMA

AUTHORS
FLORENCE F. RAGUSA AND M. GOLDSTEIN
HARVEY ABRAMSON
MARGARET FRANTZ
NEW YORK UNIVERSITY

VIM ROUTINE NYUBESS

DATE WRITTEN: BEFORE 11/65

DATE(S) REVISED
11/65 - HA
09/01/67 - MF

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK ?)
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'BESSY'

PURPOSE
BESSEL FUNCTION OF THE SECOND KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
FOR N=0, Y(NU) AND Y(NU+1) ARE ALWAYS COMPUTED.

THIS SUBROUTINE ALSO COMPUTES THE J-BESSEL FUNCTION.

USAGE
CALL BESSY (X, FNU, N, VJ, VY)

DESCRIPTION OF PARAMETERS
X - THE ARGUMENT (X > 0.0)
FNU - NU, THE FRACTIONAL PART OF THE ORDER (0. $\leq$ FNU $\leq$ 1.)
N - HIGHEST ORDER IS (N+FNU)
ABS(N)+1 TABLE ENTRIES ARE TO BE COMPUTED
VJ - ARRAY TO CONTAIN THE COMPUTED TABLE
(DIMENSION MUST BE AT LEAST: MAX(N+13,X+28), THE REST OF THE ARRAY IS WORK AREA)
VJ(1) = J0(X), WHERE J0 IS J(0+FNU)
ETC.
VY - ARRAY TO CONTAIN THE COMPUTED Y-TABLE
(DIMENSION MUST BE AT LEAST: MAX(N+13,X+28), THE REST OF THE ARRAY IS WORK AREA)
VY(1) = Y0(X), WHERE Y0 IS Y(0+FNU)
ETC.

CM REQUIRED: 452B

METHOD
SEE "RECURRENCE TECHNIQUES FOR THE CALCULATION OF BESSEL FUNCTIONS", M. GOLDSTEIN AND R. THALER, MTAC, VOL. XIII, NO. 66, APRIL 1959.

FOR X $\geq$ 10.0, ASYMPTOTIC VALUES ARE COMPUTED USING THE SO-CALLED PHASE AMPLITUDE METHOD. SEE "BESSEL FUNCTIONS FOR LARGE ARGUMENTS", M. GOLDSTEIN AND R. THALER, MTAC, VOL XII, NO. 61, JANUARY 1958.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS COS IABS MAX0 SIN
SQRT
OTHERS
BESSJ
GAMMA

AUTHORS
FLORENCE F. RAGUSA AND M. GOLDSTEIN
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VIM ROUTINE NYUBESS

DATE WRITTEN: BEFORE 11/65

DATE(S) REVISED
11/65 - HA
09/01/67 - MF

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK ?)
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'BSJ'

PURPOSE
SPHERICAL BESSEL FUNCTION

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
EVALUATES THE SPHERICAL BESSEL FUNCTION J-SUB-N(X) FOR N=-1,0,...,I BY MEANS OF A RECURSIVE RELATION AND REASONABLE STARTING VALUES. STARTING VALUES ARE GENERATED WITHIN THE SUBROUTINE.

USAGE
CALL BSJ (I, X, BJ)

DESCRIPTION OF PARAMETERS
I - HIGHEST ORDER DESIRED
X - SINGLE PRECISION FLOATING POINT VARIABLE
BJ - ARRAY DIMENSIONED AT LEAST I+2 FOR SOLUTIONS (BJ(N+2) = J-SUB-N(X))

CM REQUIRED: 432B

METHOD
A. THE VALUES ARE COMPUTED BY USING THE RECURSION FORMULA:

$$J_{I-1}(X) + J_{I+1}(X) = \frac{2I+1}{X} J_I(X)$$

IF X>20.5, THE RECURSION IS FORWARD.
IF X≤20.5, THE RECURSION IS BACKWARD.
FOR VARIOUS RANGES (X<20.5), AN UPPER LIMIT, NU, IS SET. BJ(NU+1) IS THEN SET TO ZERO, AND THE RECURSION PROCESS IS EXECUTED.

B. RANGE: THE FOLLOWING DOMAINS HAVE BEEN CAREFULLY CHECKED: 1≤X≤25; I≤25. ERROR IS LESS THAN ±5X10**-11. POSSIBLE DOMAINS ARE: 0≤I<25 AND 0<X≤100. (CAUTION: FOR LARGER DOMAINS, CHECK DIMENSIONING IN THE SUBROUTINE.)
NOTE: IF I>>X, J-SUB-I(X) IS VERY SMALL.

REFERENCES
HANDBOOK OF MATHEMATICAL FUNCTIONS, AMS 55, NATIONAL BUREAU OF STANDARDS.

ASSOCIATION OF COMPUTING MACHINERY, "GENERATION OF SPHERICAL BESSEL FUNCTIONS", F. J. CORBATO AND J. L. URETSKY, JULY 1959, VOL. 6, NO. 3, PP. 366-375.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      COS   SIN
   OTHERS
      NONE

AUTHORS
   R L PEXTON - LAWRENCE RADIATION LABORATORY
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DATE WRITTEN: 01/06/65 (RLP)

DATE(S) REVISED
   11/65 (DAW)

LOCATION OF DECKS
   SOURCE
      TAPE LABELLED: CLIBRARYUPD3
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'BUFSIZE'

PURPOSE
PRINT MESSAGE IN DAYFILE FOR EACH FILE SPECIFIED
INDICATING BUFFER SIZE AND WHETHER BUFFER IS
CURRENTLY ALLOCATED.

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: COMPASS

REMARKS
THIS ROUTINE PICKS UP THE BUFFER SIZE (BFS) FROM WORD 4 OF
THE FIT. IT ALSO DETERMINES IF THE BUFFER IS CURRENTLY
ALLOCATED BY CHECKING THE BUFFER FIRST WORD ADDRESS (FWB)
IN WORD 6 OF THE FIT. IT PRINTS A REPORT IN THE DAYFILE
OF THE FORM:

```
                    FILE BUFFER SIZES
      FILE (LFN)    SIZE  (OCTAL)      ALLOCATED
       XXXXXXX         XXXXXX             Y OR N
```

USAGE
CALLED FROM COBOL PROGRAM
ENTER BUFSIZE USING FILENAME1, FILENAM2,.....
WHERE FILENAMEX IS NAME OF FILE IN FD STATEMEN

CALLED FROM FTN PROGRAM
CALL BUFSIZE (FIT1, FIT2, ...)
WHERE FITX IS ADDRESS OF A FILE INFORMATION
TABLE.

CM REQUIRED: 72B WORDS

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
BRUCE D. BLACK - DTNSRDC CODE 1892.1 (CDC)

DATE WRITTEN: 04/07/78

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'CELLI'
SUBROUTINE 'ELLI'

PURPOSE
COMPLETE AND INCOMPLETE ELLIPTIC INTEGRALS OF THE FIRST AND SECOND KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
CELLI IS AN ENTRY POINT IN ELLI.

WHEN ABS(PHI) $\leq$ PI/2, F AND E ARE ACCURATE TO AT LEAST 10 SIGNIFICANT FIGURES. AS ABS(PHI) GETS LARGE, THE ACCURACY WILL NOT BE AS GOOD SINCE ELLI USES THE TANGENT SUBROUTINE WHICH BECOMES LESS ACCURATE AS THE ANGLE ABS(PHI) INCREASES.

USAGE
```
CALL CELLI (PHI, CAY, F, E)
CALL ELLI  (PHI, CAY, F, E)
```

DESCRIPTION OF PARAMETERS
```
PHI - UPPER LIMIT OF INTEGRAL
      (NOT USED BY CELLI WHICH ASSUMES PI/2)
CAY - THE PARAMETER IN THE INTEGRAL
F   - OUTPUT THE ELLIPTIC INTEGRAL OF THE FIRST KIND
      (F(PHI,CAY))
E   - OUTPUT THE ELLIPTIC INTEGRAL OF THE SECOND KIND
      (E(PHI,CAY))
```

CM REQUIRED: 457B (+ 60B FOR LABRT)

ERROR MESSAGES
IF K > 1, F AND E DO NOT EXIST. A MESSAGE IS PRINTED AND F AND E ARE SET TO PHI.

IF K=1 AND ABS(PHI) $\geq$ PI/2, F DOES NOT EXIST. A MESSAGE IS PRINTED AND F IS SET TO SIGN(PHI)*1.0E+294. E EXISTS AND IS COMPUTED.

OUTPUT UNITS

UNIT #	LFN	USE
	OUTPUT	ERROR MESSAGES PRINTED BY LABRT

METHOD
WHEN K<1, LANDEN'S TRANSFORMATION IS USED.

WHEN K=1, E IS COMPUTED BY:

$$E(PHI,1) = N + ABS(SIN(PHI) - SIN(N*PI/2))$$

WHERE N IS THE INTEGRAL PART OF PHI*(2/PI).

WHEN K=1 AND ABS(PHI) < PI/2, F IS COMPUTED BY:

$$F(PHI,1) = .5 * LN\left(\frac{1+SIN(PHI)}{1-SIN(PHI)}\right)$$

REFERENCE: "HANDBOOK OF MATHEMATICAL FUNCTIONS" BY M. ABRAMOWITZ AND I. A. STEGUN.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

ABS	AINT	ALOG	AMIN1	AMOD
ATAN	FLOAT	INT	MOD	SIGN
SIN	SQRT	TAN		

PART OF PROGRAM
LABRT - PRINT ERROR MESSAGES
OTHERS
NONE

AUTHORS
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LOS ALAMOS SCIENTIFIC LABORATORY

VIM ROUTINE LASL C304A

DATE WRITTEN: 02/05/68

DATE(S) REVISED
02/69 - DH

LOCATION OF DECKS
SOURCE
CODE 1892 (LISTING ONLY)
(*DECK ?)
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'CENTER'

PURPOSE
CENTER A CHARACTER STRING WITHIN AN OUTPUT FIELD

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
USEFUL FOR CENTERING HEADINGS ON A PAGE. FOR INSTANCE, IF 'THIS IS A HEADING' IS TO BE CENTERED FOR A 132-COLUMN WIDE PAGE, THE FOLLOWING CAN BE USED:

```
DIMENSION IN(2), OUT(14)
IN(1) = 10HTHIS IS A
IN(2) = 10HHEADING
CALL CENTER (IN, 2, OUT, 132)
```

ON RETURN, 'OUT' WILL CONTAIN 'THIS IS A HEADING' IN POSITIONS 58 THRU 74 (WORD 6, POSITION 8 THRU WORD 8, POSITION 4). POSITIONS 1-56 AND 75-132 WILL CONTAIN BLANKS.

USAGE
CALL CENTER (IN, LIN, OUT, NCHOUT)

DESCRIPTION OF PARAMETERS

IN	- INPUT ARRAY CONTAINING CHARACTER STRING TO BE CENTERED (CHARACTER STRING STARTS IN POSITION 1 AND ENDS WITH LAST NON-BLANK CHARACTER)
LIN	- NUMBER OF WORDS IN 'IN'
OUT	- OUTPUT ARRAY IN WHICH 'IN' IS TO BE CENTERED
NCHOUT	- NUMBER OF CHARACTERS IN 'OUT' WITHIN WHICH 'IN' IS TO BE CENTERED

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MOD   MOVLEV
   OTHERS
      GETCHA - GET CHARACTER FROM ARRAY (CDC VERSION)
      LASTCH - FIND LAST NON-BLANK IN ARRAY
      MOVLEV - MOVE AN ARRAY (B7700 VERSION)
      MOVSTR - MOVE A STRING (B7700 VERSION)
      PUTCHA - INSERT CHARACTER INTO ARRAY (CDC VERSION)
      VFILL   - FILL ARRAY WITH SPECIFIED WORD

CM REQUIRED: B7700: EST 267 WORDS; CDC 6000: 145B

AUTHOR
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DATE WRITTEN: 05/19/75

DATE(S) REVISED
   05/04/76
   07/01/80 - CONVERT TO B7700

LOCATION OF DECKS
   SOURCE
      B7700   :   *SOURCE/NSRDC/CENTER
      CDC 6000:   UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      B7700   :   *NSRDC/CENTER
      CDC 6000:   EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'CGAUSS'

PURPOSE
COMPLEX SOLUTION OF SIMULTANEOUS EQUATIONS AND DETERMINANT
BY ITERATIVE GAUSSIAN ELIMINATION

FUNCTIONAL CATEGORIES: F4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
TO INCREASE BEYOND 10 BY 10, THE DIMENSIONS OF ARRAYS A, AA, B, BB, X, XX AND IN MUST BE CHANGED.

USAGE
```
COMPLEX AA(10,10), BB(10,10), XX(10,10), DET
CALL CGAUSS (N, M, AA, BB, XX, VAL2, DET, MM, NA, NX)
```

DESCRIPTION OF PARAMETERS

N	- NUMBER OF ROWS OF AA, BB, XX (MAX: 10)
M	- NUMBER OF COLUMNS OF RIGHT-HAND SIDES (MAX: 10)
AA	- COMPLEX ARRAY OF COEFFICIENTS FOR SIMULTANEOUS EQUATIONS AA*XX=BB (MAX: 10 BY 10)
BB	- COMPLEX ARRAY OF RIGHT-HAND-SIDES FOR AA*XX=BB (MAX: 10 BY 10)
XX	- COMPLEX ARRAY OF SOLUTIONS OF AA*XX=BB (MAX: 10 BY NX)
VAL2	- OUTPUT THE INFINITY NORM OF THE CORRECTION
DET	- OUTPUT THE COMPLEX DETERMINANT OF AA
MM	- NUMBER OF ITERATIONS (MM=0 RETURNS THE RESULT OF THE FIRST GAUSSIAN ELIMINATION)
NA	- DIMENSIONS OF AA AND BB AND FIRST DIMENSION OF XX
NX	- SECOND DIMENSION OF XX

CM REQUIRED: 1711B

METHOD
A FIRST SOLUTION FOR XX IS OBTAINED DIRECTLY. BB-AA*XX IS CALCULATED AS DD. THE RESIDUAL EQUATION AA*X=DD IS SOLVED AND THE SOLUTION ADDED TO XX. THIS PROCESS CONTINUES FOR MM CYCLES. IF MM=0, THE RESULT OF THE FIRST GAUSSIAN ELIMINATION IS RETURNED.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      CABS
   OTHERS
      NONE

AUTHORS
   UNIVERSITY OF MARYLAND
   SUE VOIGT

DATE WRITTEN: 1971

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
                                        (*DECK AMCGAUS)
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'CHFILL'

PURPOSE
FILL (PORTION OF) ARRAY WITH CHARACTER

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

REMARKS
SAME CALLING SEQUENCE AS CDC 6000, EXCEPT FOR TYPE.

USAGE
CALL CHFILL (FILLCH, TO, TOPOS, NCHAR)

DESCRIPTION OF PARAMETERS
FILLCH - FILL CHARACTER (1R OR 1H OR " ")
TO - INTEGER ARRAY TO BE FILLED
TOPOS - STARTING CHARACTER POSITION IN 'TO'
(CHARACTER 1 IS LEFT-MOST CHARACTER OF TO(1))
NCHAR - NUMBER OF CHARACTERS TO BE FILLED

CM REQUIRED: 56B

EXAMPLE
TO: **********
AFTER CALL CHFILL (1R/, TO, 23, 7)
TO: **********///////*

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND SHIFT
OTHERS
PUTCHA - INSERT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
L11FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
R11FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/10/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'CHNGSEQ'

PURPOSE
ALLOW COBOL4 USER TO DEFINE HIS OWN COLLATING SEQUENCE

FUNCTIONAL CATEGORIES: M4

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
USER MUST USE THE U OPTION ON THE COBOL CALL CARD.

BINARY ZERO IS THE 64TH CHARACTER IN THE COLLATING SEQUENCE.

ROUTINE SETS TABLES AFFECTING COLLATING SEQUENCE FOR COBOL IF TESTS, COBOL SORT, INDEX SEQ FILE SEQUENCE, ETC.

USAGE
CALL CHNGSEQ USING MYTBL.

DESCRIPTION OF PARAMETER
THE USER MUST SET UP A DATA ITEM 63 CHARACTERS IN LENGTH CONTAINING THE CHARACTERS IN THE ORDER HE WISHES THE COLLATING SEQUENCE TO BE. ALL 63 CHARACTERS MUST BE PRESENT.

NOTE: TO SET " INTO THE STRING, REDEFINE AND USE MOVE QUOTE TO .....

EXAMPLE:

```
01  MYTBL PIC X(63) VALUE " @:¢_#&'?>\¬.);+$*-/,(= <ABCDEF
-     "GHI|JKLMNOPQR!STUVWXYZ0123456789".
01  MYTBLA REDEFINES MYTBL.
    03  ENTR PIC X OCCURS 63 TIMES.

RECALL THAT A NON-NUMERIC LITERAL MUST CONTINUE THRU
COL 72 OF THE FIRST CARD AND THAT CONTINUATION CARD
MUST HAVE A HYPHEN IN COL 7.  (EXAMPLE HERE DOESN'T
GO TO COL. 72).

PROCEDURE DIVISION.
PAR1.
    MOVE QUOTE TO ENTR (24).
    CALL CHNGSEQ USING MYTBL.
```

CM REQUIRED: 27B

METHOD
COLLATING SEQUENCE TABLES IN COBOL OBJECT TIME ROUTINES ARE CHANGED.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

AUTHOR
   BRUCE D BLACK DTNSRDC 1892.1 (CDC)

DATE WRITTEN: 11/15/77

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'CLUNLD'

PURPOSE
CLOSE AND UNLOAD A FILE

FUNCTIONAL CATEGORIES: Q3

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

REMARKS
CAUTION: FOR ICLT=1 OR 2, BE SURE BUFFERS HAVE BEEN FLUSHED BEFORE UNLOADING A PERMANENT FILE IF YOU EXPECT TO USE IT AGAIN. (I.E., CLOSE THE FILE BEFORE CALLING CLUNLD)

CAUTION: RANDOM PERMANENT FILES MUST BE CLOSED BEFORE CLUNLD IS CALLED TO INSURE THAT THE LATEST INDEX IS WRITTEN.

FORTRAN SEQUENTIAL FILES SHOULD HAVE THEIR BUFFERS FLUSHED BE REWINDING THEM BEFORE CALLING CLUNLD.

USAGE
CALL CLUNLD (IERR, ICLT, LFN)

DESCRIPTION OF PARAMETERS
IERR - ERROR RETURN CODE (0=NO ERRORS)
ICLT - TYPE OF CONTENTS OF 'LFN'
1 - LFN CONTAINS THE ADDRESS OF A FET.
A CLOSE-UNLOAD IS PERFORMED ON THIS FET.
2 - LFN CONTAINS AN LFN TO BE UNLOADED.
A DUMMY FET IS CREATED AND THE FILE UNLOADED.
3 - LFN CONTAINS A FILE NAME OR FORTRAN LOGICAL UNIT NUMBER (I.E., ANY FILE ON THE FORTRAN PROGRAM STATEMENT). THE FIT WILL BE FOUND AND THE FILE UNLOADED.
NOTE: CLOSEM (A RECORD MANAGER ROUTINE) IS CALLED TO CLOSE THE FILE.
NOTE: A DUMMY FET IS CREATED TO UNLOAD A FILE THAT RECORD MANAGER DOESN'T KNOW HAS BEEN ATTACHED.
LFN - CONTENTS IS DETERMINED BY 'ICLT'

CM REQUIRED: 43B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      CLUXXX   FNDFIT   INDCMT   IZONK   ZIO

AUTHOR
   C M CHERNICK - DTNSRDC CODE 1832

DATE WRITTEN: 11/15/71

DATE(S) REVISED
   06/01/72 11/20/74 02/21/75 05/75   04/76

LOCATION OF DECKS
   SOURCE
      CODE 1832
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'CMPINV'

PURPOSE
COMPLEX MATRIX INVERSION

FUNCTIONAL CATEGORIES: F4 A2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE REAL AND/OR IMAGINARY PARTS OF THE MATRIX 'A' MAY BE SINGULAR.

USAGE
CALL CMPINV (A, N, N1, C, ID, E, N2, INDEX)

DESCRIPTION OF PARAMETERS

A	- COMPLEX INPUT MATRIX (NOT DESTROYED BY SUBROUTINE)
N	- DIMENSION OF A AND C (N X N)
N1	- NUMBER OF ROWS IN A AND C CURRENTLY FULL
C	- INVERSE RESULT MATRIX (MAY BE THE SAME AS A)
ID	- RETURN CODE 1 - INVERSION SUCCESSFUL 2 - MATRIX SINGULAR
E	- TEMPORARY ARRAY SOLVING N2 X N2 SYSTEM
N2	- NO SMALLER THAN N1+N1
INDEX	- TEMPORARY ARRAY USED IN INVERSION (N2,3)

THE CALLING PROGRAM MUST INCLUDE:

```
COMPLEX A(N,N), C(N,N)
REAL    E(N2,N2), INDEX(N2,3)
```

CM REQUIRED: 147B

METHOD
THE SYSTEM SOLVED IS THE EXPANDED MATRIX

$$E = \begin{vmatrix} \overline{AR} & -\overline{AI} \\ \\ \underline{AI} & \underline{AR} \end{vmatrix}$$

WHERE CR IS TAKEN AS THE UPPER LEFT CORNER OF THE INVERSE AND CI IS TAKEN AS THE LOWER LEFT CORNER OF THE INVERSE. (LANCZOS, APPLIED ANALYSIS, P 137). THE INVERSE IS COMPUTED BY SUBROUTINE MATINS (ALSO ON NSRDC) WHICH USES GAUSS-JORDAN ELIMINATION. THIS METHOD FINDS AN INVERSE IF IT EXISTS, EVEN IF REAL AND IMAGINARY PARTS OF A ARE BOTH INDIVIDUALLY SINGULAR. IDENTIFICATION OF A SINGULAR COMPLEX MATRIX IS RETURNED TO THE CALLING PROGRAM.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AIMAG   CMPLX   REAL
   OTHERS
      MATINS - MATRIX INVERSION

AUTHOR
   SHARON E GOOD - DTNSRDC CODE 1892.2

DATE WRITTEN: 06/10/71

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      TAPE LABELLED: CLIBRARYUPD3,D=HY (DECKNAME: AMCMAT)
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

FUNCTION 'COMPSTR'

PURPOSE
COMPARE TWO CHARACTER STRINGS

FUNCTIONAL CATEGORIES: M0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
TEST = COMPSTR (A, FROMA, B, FROMB, NCHAR)

DESCRIPTION OF PARAMETERS
A - ARRAY CONTAINING FIRST CHARACTER STRING
FROMA - STARTING CHARACTER POSITION IN A
(POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN A(1))
B - ARRAY CONTAINING SECOND CHARACTER STRING
FROMB - STARTING CHARACTER POSITION IN B
(POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN B(1))
NCHAR - NUMBER OF CHARACTERS TO COMPARE
COMPSTR - WILL RETURN ONE OF:
-1. - STRING IN A IS LESS THAN STRING IN B
0. - STRING IN A IS EQUAL TO STRING IN B
+1. - STRING IN A IS GREATER THAN STRING IN B

CM REQUIRED: 105B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
GETCHA - GET CHARACTER FROM ARRAY

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/04/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'CONTRCT'

PURPOSE
   SQUEEZE ARRAY OF 1R-FORMAT CHARACTERS TO LEFT

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   SEE SUBROUTINE 'EXPAND'.

USAGE
   CALL CONTRCT (A, B, NCHAR)

DESCRIPTION OF PARAMETERS
   A   - INPUT ARRAY WHOSE ELEMENTS EACH CONTAIN ONE
           CHARACTER IN THE RIGHT-MOST 6 BITS (1R FORMAT)
   B   - OUTPUT ARRAY WHOSE ELEMENTS WILL EACH CONTAIN 10
           CHARACTERS FROM ARRAY A (ANY LEFT-OVER BITS OF THE
           LAST WORD USED IN ARRAY B WILL BE CLEARED TO 0B)
   NCHAR - NUMBER OF CHARACTERS IN ARRAY A

CM REQUIRED: 55B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MASK   MOD
   OTHERS
      PUTCHA - INSERT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
   NWORD   - COMPUTE SUBSCRIPT

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/04/77

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL.ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'COUPLE'

PURPOSE
LOGICALLY CONNECT (PORTIONS OF) TWO WORDS

FUNCTIONAL CATEGORIES: R1

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL COUPLE (FL, AWORD, AB, BWORD, BB, LC, IOAC)

DESCRIPTION OF PARAMETERS

FL	- NUMBER OF BITS TO PROCESS	
AWORD	- FIRST WORD (FROM)	
AB	- STARTING BIT POSITION IN AWORD	
BWORD	- SECOND WORD (TO)	
BB	- STARTING BIT POSITION IN BWORD	
LC	- CODE FOR LOGICAL CONNECTIVE DESIRED	
	0 - PUT ZEROS INTO BWORD FIELD	(0)
	1 - AND THE FIELDS	(M.A)
	2 - AND THE COMPLEMENT OF A TO B	(M.A*)
	3 - NUMBER OF ONE IN THE LAST FIELD	(M)
	4 - AND THE COMPLEMENT OF B TO A	(M*.A)
	5 - SUBSTITUTE FIELD OF A INTO B	(A)
	6 - EXCLUSIVE OR	
	7 - OR	(M+A)
	8 - AND COMPLEMENTS	(A*.B*)
	9 - IDENTITY	(B=A)
	10 - SUBSTITUTE COMPLEMENT OF A INTO B	(A*)
	11 - OR THE COMPLEMENT OF A TO B	(M+A*)
	12 - COMPLEMENT OF B	(M*)
	13 - OR A TO THE COMPLEMENT OF B	(A+M*)
	14 - OR THE COMPLEMENTS OF A AND B	(A*+M*)
	15 - PUT ONES INTO BWORD FIELD	(1)
IOAC	- OUTPUT NUMBER OF ONE-BITS FOR LC=3	

CM REQUIRED: 224B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
IAOC - COUNT ONE BITS IN A WORD
MASKIT - MULTIPLE-FIELD MASK GENERATOR

AUTHOR
NWL

DATE WRITTEN:

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'DATCNV'

PURPOSE
CONVERT DATE FORMATS

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
MAY BE USED FOR ANY GREGORIAN DATE FROM OCT 15, 1582 THRU FEB 28, 4000.

USEFUL IS DETERMINING THE ELAPSED NUMBER OF DAYS BETWEEN TWO CALENDAR DATES.

MAY BE USED TO FIND THE DATE SO MANY DAYS FROM A GIVEN DATE.

IF THE DATE IS RETAINED IN A DATA BASE IN THE RELATIVE-DAY FORM, IT CAN BE USED IN MANY COMPUTATIONS AND CONVERTED FOR PRINTOUT WITHOUT THE NEED TO WORRY ABOUT LEAP YEARS AND CHANGE OF CENTURY.

USAGE
CALL DATCNV (ITYPE, IYR, IMO, IDYMO, IDYRD, IDYYR, IDYWK)

DESCRIPTION OF PARAMETERS

ITYPE	- TYPE OF CONVERSION DESIRED					
	1 - IN:	IYR	IMO	IDYMO		
	OUT:	IDYRD	IDYYR	IDYWK		
	2 - IN:	IYR	IDYYR			
	OUT:	IMO	IDYMO	IDYRD	IDYWK	
	3 - IN:	IDYRD				
	OUT:	IYR	IMO	IDYMO	IDYYR	IDYWK
IYR	- YEAR (E.G., 1979)					
IMO	- MONTH (1 TO 12)					
IDYMO	- DAY-OF-MONTH (1 TO 31)					
IDYRD	- RELATIVE DAY					
	(RETURNS -1 IF ITYPE IS OUT OF RANGE)					
IDYYR	- DAY-OF-YEAR (1 TO 366)					
IDYWK	- DAY-OF-WEEK (0 TO 6, SUN IS 0)					

CM REQUIRED: CDC: 165B B7700: EST 154 WORDS

EXAMPLES

1. CONVERT JULY 11, 1979 TO THE OTHER FORMS:

```
    CALL DATCNV (1, 1979, 7, 11, IDYRD, IDYYR, IDYWK)
```

   RETURNS IDYRD=2444066 IDYYR=192 IDYWK=3 (WEDNESDAY)

2. CONVERT DAY 192 OF 1979 TO THE OTHER FORMS:

```
    CALL DATCNV (2, 1979, IMO, IDYMO, IDYRD, 192, IDYWK)
```

   RETURNS IMO=7 IDYMO=11 IDYRD=2444066 IDYWK=3

3. CONVERT RELATIVE DAY 2444066 TO OTHER FORMS:

```
    CALL DATCNV (3, IYR, IMO, IDYMO, 2444066, IDYYR,
   A                 IDYWK)
```

   RETURNS IYR=1979 IMO=7 IDYMO=11 IDYYR=192 IDYWK=3

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

NONE

OTHERS

JGDATE - JULIAN-GREGORIAN CONVERTER (MULTI-YEAR)
JULIAN - JULIAN-GREGORIAN CONVERTER (SINGLE YEAR)
WEKDAY - FIND DAY-OF-WEEK

AUTHOR

DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 07/11/79

DATE(S) REVISED

LOCATION OF DECKS

SOURCE

CDC 6000: UPDATE LIBRARY: NSRDCPL,ID=CSYS
B7700   : *SOURCE/NSRDC/DATCNV

OBJECT

CDC 6000: EDITLIB USER LIBRARY: NSRDC
B7700   : *NSRDC/DATCNV

SUBROUTINE 'DATFMT'

PURPOSE
   DATE FORMAT CONVERSION

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV

COMPUTERS
   BURROUGHS B7700
   CDC 6000

REMARKS
   FOR CDC, ALL PARAMETERS ARE SIMPLE INTEGER VARIABLES.
   FOR B7700, 'OLD' AND 'NEW' ARE 2-WORD REAL ARRAYS.

USAGE
   CALL DATFMT (FMTOLD, FMTNEW, OLD, NEW)

DESCRIPTION OF PARAMETERS
   FMTOLD - INPUT FORMAT (OLD) -- ONE OF
             1 - 'MM/DD/YY   '
             2 - ' MM/DD/YY   '
             3 - 'MMDDYY   '
            -1 - 'YY/MM/DD   '
            -2 - ' YY/MM/DD   '
            -3 - 'YYMMDD   '
   FMTNEW - OUTPUT FORMAT (NEW)
            (SAME VALUES AS FMTOLD)
   OLD   - DATE TO BE CONVERTED   (SEE REMARKS)
   NEW   - WILL CONTAIN CONVERTED DATE   (SEE REMARKS)

CM REQUIRED: B7700: CORE: EST 252 WORDS; STACK: EST 4 WORDS
             CDC : 146B

EXAMPLE
   CHANGE MMDDYY TO YY/MM/DD:
      B7700---
         REAL OLD(2)/ '072579   '/
         REAL NEW(2)
         CALL DATFMT (3, -1, OLD, NEW)
   NEW WILL CONTAIN: '79/07/25   '.
      CDC 6000---
         INTEGER FMTOLD, FMTNEW, OLD, NEW
         DATA OLD/ "072579"/
         CALL DATFMT (3, -1, OLD, NEW)
   NEW WILL CONTAIN: "79/07/25 ".

```
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      B7700:     ABS
      CDC  :     AND        OR         SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS (CDC 6000)
   FAST R-FORMAT DECODE (RIGHT-ADJ. ZERO-FILLED)
      R21FMT     R22FMT     R23FMT     R24FMT     R25FMT
      R27FMT     R28FMT

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: B7700: 08/08/79
              CDC  : 02/22/80

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      B7700: *SOURCE/NSRDC/DATFMT
      CDC  : UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      B7700: *NSRDC/DATFMT
      CDC  : EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'DISCOT'

PURPOSE
SINGLE OR DOUBLE INTERPOLATION

FUNCTIONAL CATEGORIES: E1

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
GIVEN A FUNCTION WITH TWO INDEPENDENT VARIABLES, X AND Z, THIS SUBROUTINE PERFORMS KX- AND KZ-ORDER INTERPOLATION TO CALCULATE THE DEPENDENT VARIABLE. ALL SINGLE-LINE FUNCTIONS ARE READ IN AS 2 SEPARATE ARRAYS AND ALL MULTI-LINE FUNCTIONS ARE READ IN AS 3 SEPARATE ARRAYS.

WHEN TABULATING DISCONTINUOUS FUNCTIONS, THERE MUST ALWAYS BE K+1 POINTS ABOVE AND BELOW THE DISCONTINUITY IN ORDER TO GET PROPER INTERPOLATION.

WHEN TABULATING ARRAYS FOR THIS SUBROUTINE, BOTH INDEPENDENT VARIABLES MUST BE IN ASCENDING ORDER.

IN SOME ENGINEERING PROGRAMS WITH MANY TABLES, IT IS QUITE DESIRABLE TO READ IN ONE ARRAY OF X'S THAT COULD BE USED FOR ALL LINES OF A MULTI-LINE FUNCTION OR DIFFERENT FORMULA. THIS NOT ONLY SAVES MUCH TIME IN PREPARING TABULAR DATA, BUT CAN ALSO SAVE MANY LOCATIONS PREVIOUSLY USED WHEN EVERY Y-COORDINATE HAD TO HAVE A CORRESPONDING X-COORDINATE. SEE EXAMPLES.

ANOTHER FEATURE IS THE POSSIBILITY OF A MULTI-LINE FUNCTION WITH NO EXTRAPOLATION ABOVE THE TOP LINE. SEE EXAMPLES.

USAGE
CALL DISCOT (X, Z, TABX, TABY, TABZ, NC, NY, NZ, Y)

DESCRIPTION OF PARAMETERS
X - X-ARGUMENT
Z - Z-ARGUMENT
(MAY BE SAME AS X ON SINGLE LINES)
TABX - ARRAY OF X'S
TABY - ARRAY OF Y'S
TABZ - ARRAY OF Z'S
NC - CONTROL WORD (±HTU)
+ IMPLIES NX = NY/NZ
- IMPLIES NX = NY
H=0 - EXTRAPOLATE WHEN Z>ZMAX
=1 - NO EXTRAPOLATION ABOVE ZMAX
T=1 TO 7 - DEGREE INTERPOLATION IN X DIRECTION
U=1 TO 7 - DEGREE INTERPOLATION IN Z DIRECTION
NY - NUMBER OF POINTS IN Y ARRAY
NZ - NUMBER OF POINTS IN Z ARRAY
Y - OUTPUT DEPENDENT VARIABLE

CM REQUIRED: 520B

EXAMPLES

1) GIVEN Y = F(X) KX=3

```
      PROGRAM SAMPL1 (TAPE7, ....
      DIMENSION TABX(50), TABY(50)
   10 READ (7, 1) (TABX(I), TABY(I), I=1,50)
      READ (7, 1) X
    1 FORMAT (8E9.5)
      CALL DISCOT (X, X, TABX, TABY, TABY, -30, 50, 0, Y)
      ...
```

2) GIVEN Y = F(X,Z) KX=7, KZ=3 NX .NE. NY

```
      PROGRAM SAMPL2 (TAPE7,....
      DIMENSION TABX(80), TABY(800), TABZ(10)
   10 READ (7, 1) TABX
      READ (7, 1) TABY
      READ (7, 1) TABZ
      READ (7, 1) X, Z
    1 FORMAT (8E9.5)
      CALL DISCOT (X, Z, TABX, TABY, TABZ, 73, 800, 10, Y)
      ...
```

3) GIVEN Y = F(X,Z) KX=7, KZ=3 NX=NY

```
      PROGRAM SAMPL3 (TAPE7,....
      DIMENSION TABX(800), TABY(800), TABZ(10)
   10 READ (7, 1) TABX
      READ (7, 1) TABY
      READ (7, 1) TABZ
      READ (7, 1) X, Z
    1 FORMAT (8E9.5)
      CALL DISCOT (X, Z, TABX, TABY, TABZ, -73, 800, 10, Y)
      ...
```

4) GIVEN Y=F(X,Z) KX=7, KZ=3 NX=NY
NO EXTRAPOLATION ABOVE Z-MAX

SAME AS EXAMPLE 3 WITH 6TH PARAMETER OF CALL TO DISCOT EQUAL TO -173.

METHOD

LAGRANGE'S INTERPOLATION FORMULA IS USED IN BOTH THE X AND Z DIRECTION. SEE "METHODS IN NUMERICAL ANALYSIS" BY NIELSEN.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   PART OF PROGRAM
      DISSER (102B)
      LAGRAN (64B)
      UNS   (31B)
   OTHERS
      NONE

AUTHOR
   J. H. SUM
   ALLISON DIVISION
   GENERAL MOTORS CORPORATION

   SHARE NUMBER 1129

DATE WRITTEN: 05/12/61

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
                                        (*DECK AQALL1)
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'DMPA'

PURPOSE
   CALLABLE OCTAL AND CHARACTER DUMP OF SPECIFIED PORTION
   OF USER'S FIELD LENGTH (FL) (BY ACTUAL LOCATION)
   (NO HEADINGS ARE PROVIDED)

FUNCTIONAL CATEGORIES: N2

USAGE
   CALL DMPA (FWA, N, INIT)
   CALL DMPA (FWA, N)

DESCRIPTION OF PARAMETERS
   FWA - FIRST WORD ADDRESS OF AREA TO DUMP
          (E.G., LOCF (ARRAY))
   N   - NUMBER OR WORDS TO DUMP
   INIT - STARTING WORD ADDRESS TO BE PRINTED
          (IF OMITTED, 0 IS USED)

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
   OTHERS
      EQU60   - LOGICAL ARRAY COMPARE
      MFETCH - READ WORD IN USER'S FL

LANGUAGE: FORTRAN IV

OUTPUT UNIT

UNIT #	LFN	USE
	OUTPUT	LISTABLE OUTPUT

CM REQUIRED: 315B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 06/14/76

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLB USER LIBRARY: NSRDC

SUBROUTINE 'DMPCPA'

PURPOSE
   DUMP JOB CONTROL POINT AREA

FUNCTIONAL CATEGORIES: N2

USAGE
   CALL DMPCPA

REMARKS
   OCTAL AND CHARACTER DUMP

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      DATE   TIME
   OTHERS
      RCPA   - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

OUTPUT UNITS

UNIT #	LFN	USE
	OUTPUT	LISTABLE OUTPUT

CM REQUIRED: 324B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/29/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'DPROOT'

PURPOSE
FIND ALL ROOTS OF A REAL DOUBLE PRECISION POLYNOMIAL

FUNCTIONAL CATEGORIES: C2 B4

LANGUAGE: FORTRAN IV

REMARKS
THE POLYNOMIAL HAS THE FORM:

$$A_1 + A_2 X + \ldots + A_{N+1} X^{**}N = 0$$

USAGE
CALL DPROOT (N, A, U, V, H, B, C, CONV, NPLUS2)

DESCRIPTION OF PARAMETERS

N	- DEGREE OF THE POLYNOMIAL TO BE SOLVED
A	- DOUBLE PRECISION ARRAY (DIMENSIONED N+2) CONTAINING THE COEFFICIENTS IN THE ORDER INDICATED ABOVE
U	- DOUBLE PRECISION ARRAY (DIMENSIONED N+2) WHICH WILL CONTAIN THE REAL PARTS OF THE ROOTS
V	- DOUBLE PRECISION ARRAY (DIMENSIONED N+2) WHICH WILL CONTAIN THE IMAGINARY PARTS OF THE ROOTS
H,B,C	- DOUBLE PRECISION WORK ARRAYS (EACH DIMENSIONED N+2)
CONV	- CONVERGENCE CRITERION. INITIALLY SET BY DPROOT TO 1.0D-35 (FAR BELOW THE ACTUAL STARTING CONVERGENCE CRITERION OF 5.0D-20 (CDC 6600). IF THE POLYNOMIAL HAS NOT CONVERGED AFTER A PRESCRIBED NUMBER OF TRIES, THE CONVERGENCE CRITERION IS RELAXED. IF, UPON EXIT FROM DPROOT, CONV IS NOT 1.0D-35, THE CONVERGENCE CRITERION HAS BEEN RELAXED TO THE NUMBER GIVEN. (CONV IS DOUBLE PRECISION.)
NPLUS2	- MUST BE SET TO N+2

CM REQUIRED: 1153B

METHOD
THE ROUTINE CONVERGES SIMULTANEOUSLY TOWARD A LINEAR FACTOR AND A QUADRATIC FACTOR BY NEWTON'S AND BAIRSTOW'S METHODS, RESPECTIVELY. WHEN A ROOT IS FOUND BY ONE METHOD, ITERATION CONTINUES WITH BOTH METHODS USING THEIR MOST RECENT GUESSES.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
DABS DSIGN SQRT
OTHERS
NONE

AUTHOR
HARVEY ABRAMSON - NEW YORK UNIVERSITY

DATE WRITTEN: 01/66

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TAPE LABELLED: CLIBRARYUPD3
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'DUMPA'

PURPOSE
GIVE OCTAL AND CHARACTER DUMP OF USER-SPECIFIED AREA

FUNCTIONAL CATEGORIES: N2

USAGE
CALL DUMPA (AREA, NWORDS, NAME)

DESCRIPTION OF PARAMETERS
AREA - START OF AREA TO BE DUMPED
NWORDS - NUMBER OF WORDS TO DUMP
NAME - 1-10 CHARACTER IDENTIFICATION OF START OF AREA
(E.G., 10HMYAREA(1))
(WILL BE PRINTED IN HEADING LINE)

REMARKS
LINES CONTAIN 4 WORDS EACH. IF A LINE IS THE SAME AS THE PREVIOUS LINE, IT IS NOT PRINTED (UNLESS IT IS THE LAST LINE).

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
COMPL
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

OUTPUT UNITS

UNIT #	LFN	USE
	OUTPUT	LISTABLE OUTPUT

CM REQUIRED: 257B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 02/06/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'DUMPCPA'

PURPOSE
EXPANDED DUMP OF JOB CONTROL POINT AREA

FUNCTIONAL CATEGORIES: N2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
EACH FIELD IS PRINTED SEPARATELY.

PRINTOUT IS AT 8 LINES PER INCH AND IS RESTORED TO 6 LINES PER INCH BEFORE RETURN.

USAGE
CALL DUMPCPA

CM REQUIRED: 5072B

OUTPUT UNITS

UNIT #	LFN	USE
	OUTPUT	LISTABLE OUTPUT

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND DATE OR SHIFT TIME
OTHERS
EXTBIT - EXTRACT BITS FROM A WORD
GETLIB - GET STSYEM LIBRARY NAME
IPAKLFT - SQUEEZE LEFT, REMOVE BLANKS AND 00B
RCPA - READ CONTROL POINT AREA
UNHEX3 - CONVERT 2-CHARACTER CODE TO 3 HEX DIGITS
VFILL - FILL ARRAY WITH WORD

ARITHMETIC STATEMENT FUNCTIONS
FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
L71FMT
FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

R1FMT	R11FMT	R16FMT	R19FMT	R110FMT
R21FMT	R23FMT	R25FMT	R27FMT	R29FMT
R31FMT	R32FMT	R34FMT	R35FMT	R36FMT
R38FMT	R41FMT	R45FMT	R65FMT	R71FMT

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/30/75

DATE(S) REVISED
02/27/76
01/25/78 - UPGRADE TO NOS/BE LEVEL 454
11/28/78 - UPGRADE TO NOS/BE LEVEL 461
02/05/81 - UPGRADE TO NOS/BE LEVEL 508

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'DUMPFL'

PURPOSE
CALLABLE OCTAL AND CHARACTER DUMP OF SPECIFIED PORTION
OF USER'S FIELD LENGTH (FL) (BY ACTUAL LOCATION)

FUNCTIONAL CATEGORIES: N2

USAGE
```
CALL DUMPFL                    ** SEE REMARK 1
CALL DUMPFL (LWA)
CALL DUMPFL (FWA, LWA)
```

DESCRIPTION OF PARAMETERS
FWA - FIRST WORD ADDRESS OF AREA TO DUMP
(SET TO ZERO IF ANY OF THE FOLLOWING:
1) FWA OMITTED;
2) FWA LESS THAN ZERO;
3) FWA GREATER THAN FL;
4) FWA GREATER THAN LWA)
LWA - LAST WORD ADDRESS OF AREA TO DUMP
(SET TO FL IF ONE OF THE FOLLOWING:
1) LWA OMITTED;
2) LWA LESS THAN OR EQUAL TO ZERO;
3) LWA GREATER THAN FL;
4) FWA GREATER THAN LWA)

REMARKS
1) WHEN CALLED WITHOUT AN ARGUMENT LIST, THE FTN CARD FOR THE CALLING PROGRAM MUST HAVE THE 'Z' PARAMETER.
2) DUMP IS AT 8 LINES PER INCH ON PRINTERS WHICH WILL PRINT AT THAT DENSITY.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
OTHERS
EQU60 - LOGICAL ARRAY COMPARE
FTNRFL - GET CURRENT FL
MFETCH - READ WORD IN USER'S FL

LANGUAGE: FORTRAN IV

OUTPUT UNITS

UNIT #	LFN	USE
	OUTPUT	LISTABLE OUTPUT

CM REQUIRED: 401B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 03/12/76

DATE(S) REVISED
06/14/76

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLB USER LIBRARY: NSRDC

SUBROUTINE 'ELLI'
SUBROUTINE 'CELLI'

PURPOSE
INCOMPLETE AND COMPLETE ELLIPTIC INTEGRALS OF THE FIRST AND SECOND KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
CELLI IS AN ENTRY POINT IN ELLI.

WHEN ABS(PHI) $\leq$ PI/2, F AND E ARE ACCURATE TO AT LEAST 10 SIGNIFICANT FIGURES. AS ABS(PHI) GETS LARGE, THE ACCURACY WILL NOT BE AS GOOD SINCE ELLI USES THE TANGENT SUBROUTINE WHICH BECOMES LESS ACCURATE AS THE ANGLE ABS(PHI) INCREASES.

USAGE
CALL ELLI (PHI, CAY, F, E)
CALL CELLI (PHI, CAY, F, E)

DESCRIPTION OF PARAMETERS
PHI - UPPER LIMIT OF INTEGRAL
(NOT USED BY CELLI WHICH ASSUMES PI/2)
CAY - THE PARAMETER IN THE INTEGRAL
F - OUTPUT THE ELLIPTIC INTEGRAL OF THE FIRST KIND (F(PHI,CAY))
E - OUTPUT THE ELLIPTIC INTEGRAL OF THE SECOND KIND (E(PHI,CAY))

CM REQUIRED: 457B (+ 60B FOR LABRT)

ERROR MESSAGES
IF K > 1, F AND E DO NOT EXIST. A MESSAGE IS PRINTED AND F AND E ARE SET TO PHI.

IF K=1 AND ABS(PHI) $\geq$ PI/2, F DOES NOT EXIST. A MESSAGE IS PRINTED AND F IS SET TO SIGN(PHI)*1.0E+294. E EXISTS AND IS COMPUTED.

OUTPUT UNITS

UNIT #	LFN	USE
	OUTPUT	ERROR MESSAGES PRINTED BY LABRT

METHOD
WHEN K<1, LANDEN'S TRANSFORMATION IS USED.

WHEN K=1, E IS COMPUTED BY:
E(PHI,1) = N + ABS(SIN(PHI) - SIN(N*PI/2))
WHERE N IS THE INTEGRAL PART OF PHI*(2/PI).

WHEN K=1 AND ABS(PHI) < PI/2, F IS COMPUTED BY:

$$F(PHI,1) = .5 * LN \left(\frac{1+SIN(PHI)}{1-SIN(PHI)}\right)$$

REFERENCE: "HANDBOOK OF MATHEMATICAL FUNCTIONS" BY M. ABRAMOWITZ AND I. A. STEGUN.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE

ABS	AINT	ALOG	AMIN1	AMOD
ATAN	FLOAT	INT	MOD	SIGN
SIN	SQRT	TAN		

PART OF LANGUAGE
LABRT - PRINT ERROR MESSAGES
OTHERS
NONE

AUTHORS
KARL J MELENDEZ
DUANE HARDER
LOS ALAMOS SCIENTIFIC LABORATORY

VIM ROUTINE LASL C304A

DATE WRITTEN: 02/05/68

DATE(S) REVISED
02/69 - DH

LOCATION OF DECKS
SOURCE
CODE 1892 (LISTING ONLY)
(*DECK ?)
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ELTIME'

PURPOSE
OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE LAST CALL

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL ELTIME (TIMES)

DESCRIPTION OF PARAMETER
TIMES - 7-WORD REAL ARRAY TO CONTAIN THE FOLLOWING:
1 - CPA TIME IN SECONDS
2 - CPB TIME IN SECONDS
3 - CP TIME IN SECONDS (CPA+CPB)
4 - PP TIME IN SECONDS
5 - IO TIME IN SECONDS
6 - WALL CLOCK TIME (HH.MM.SS.)
7 - WALL CLOCK TIME IN SECONDS

CM REQUIRED: 111B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
IHMS - CONVERT SECONDS TO ' HH.MM.SS.'
ISEC - CONVERT HH.MM.SS TO SECONDS
RCPA - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
R65FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 12/15/75

DATE(S) REVISED
10/31/77 - ADJUST FOR MIDNIGHT

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

FUNCTION 'EQU60'

PURPOSE
LOGICAL COMPARE (OF 2 ARRAYS)

FUNCTIONAL CATEGORIES: M0

USAGE
TEST = EQU60 (A, B, N)
TEST = EQU60 (A, B)

DESCRIPTION OF PARAMETERS
A,B - COMPARE (ARRAY) A WITH (ARRAY) B
N - NUMBER OF WORDS TO COMPARE
(IF OMITTED, N=1)
EQU60 - WILL RETURN ONE OF:
-1. IF A .LT. B (DISPLAY CODE)
0. IF A .EQ. B (DISPLAY CODE)
+1. IF A .GT. B (DISPLAY CODE)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 24B

AUTHOR
C. FLINK - NWL - KPS

DATE WRITTEN: 12/08/70

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS (*DECK COMPAB)
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'EXPAND'

PURPOSE
   EXPAND CHARACTER STRING INTO ARRAY OF 1R-FORMAT WORDS

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   SEE SUBROUTINE 'CONTRCT'.

USAGE
   CALL EXPAND (A, B, NCHAR)

DESCRIPTION OF PARAMETERS
   A   - INPUT ARRAY CONTAINING THE CHARACTER STRING
   B   - OUTPUT ARRAY WHOSE ELEMENTS WILL EACH CONTAIN ONE
            CHARACTER FROM ARRAY A IN 1R FORMAT
   NCHAR - NUMBER OF CHARACTERS IN ARRAY A

CM REQUIRED: 40B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      GETCHA - GET CHARACTER FROM ARRAY

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/04/77

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'EXPRM'

PURPOSE
EXTRACT PARAMETER FROM CONTROL CARD

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
ON EACH CALL, THE NEXT PARAMETER IS PASSED FROM RA+70B TO WORD(S) IAD, LEFT JUSTIFIED, ZERO-FILLED. ONCE A TERMINATOR IS ENCOUNTERED OR THE END OF A CARD IS REACHED, ZERO IS RETURNED.

IF CALLED WITH THE SECOND ARGUMENT, RETURNED IN ICC WILL BE A CODE INDICATING THE TYPE OF THE SEPARATOR FOUND FOLLOWING THE PARAMETER RETURNED IN IAD.

USAGE
```
CALL EXPRM (IAD)
CALL EXPRM (IAD, ICC)
```

DESCRIPTION OF PARAMETERS
IAD - WILL CONTAIN THE NEXT PARAMETER FROM THE CONTROL CARD. IF TERMINATOR OR END OF CARD, 0 IS RETURNED.
ICC - IF PRESENT, WILL CONTAIN A CODE INDICATING THE TYPE OF SEPARATOR ENCOUNTERED

DEC	OCT	SEPARATOR
1	1	,
2	2	=
3	3	/
4	4	(
5	5	+
6	6	-
7	7	BLANK
8	10B	$
14	16B	OTHER
15	17B	. OR) (TERMINATOR)

CM REQUIRED: \335B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF SHIFT
OTHERS
MFETCH - FETCH WORD IN USER'S FL

AUTHOR
C FLINK - KPS - NWL

DATE WRITTEN: 06/73

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'EXTBIT'

PURPOSE
EXTRACT BITS FROM A WORD

FUNCTIONAL CATEGORIES: M4

USAGE
CALL EXTBIT (ISTART, NBITS, IN, IOUT, IRC)

DESCRIPTION OF PARAMETERS
ISTART - FIRST/ONLY BIT TO EXTRACT
(BITS ARE NUMBERED 59-0)
NBITS - NUMBER OF BITS TO EXTRACT (1-60)
IN - INPUT WORD FROM WHICH BITS ARE TO BE EXTRACTED
OUT - OUTPUT ARRAY OF DIMENSION NBITS
IRC - RETURN CODE
0 - NO ERROR
1 - ISTART OUT OF RANGE (MUST BE 0-59)
2 - NBITS OUT OF RANGE (MUST BE 1-60)
3 - BOTH ISTART AND NBITS OUT OF RANGE

REMARKS
IF NBITS GOES PAST THE END OF THE WORD, EXTBIT WILL FILL
WITH ZEROS. THERE IS NO CHECK FOR THIS.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MAX0 MIN0 MASK SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 44B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/09/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'EXTPRM'

PURPOSE
EXTRACT NEXT PARAMETER FROM USER-SUPPLIED PARAMETER STRING

FUNCTIONAL CATEGORIES: M4

USAGE
```
CALL EXTPRM (IAREA, LAREA, IPARM, ISEP)
CALL EXTPRM (IAREA, LAREA, IPARM)
CALL EXTPRM (0    , LAREA)
CALL EXTPRM (0)
```

DESCRIPTION OF PARAMETERS

IAREA - IN - ARRAY CONTAINING PARAMETER STRING

LAREA - IN - NUMBER OF WORDS IN 'IAREA'

OUT - FIRST AND SECOND FORMS OF CALL ONLY:
0 IF END OF 'IAREA' REACHED
THIRD FORM OF CALL:
INITIALIZE FOR THIS MANY WORDS
FOURTH FORM OF CALL (OMITTED):
INITIALIZE FOR 16 WORDS
(BECAUSE 'LAREA' IS BOTH AN INPUT AND OUTPUT ARGUMENT, IT MUST ALWAYS BE USED AS A VARIABLE, NEVER AS AN EXPLICIT INTEGER.)

IPARM - OUT - NEXT PARAMETER, LEFT-JUSTIFIED, ZERO-FILLED

ISEP - OUT - IF PRESENT, CODE INDICATING TYPE OF SEPARATOR FOUND FOLLOWING THE PARAMETER RETURNED IN 'IPARM' (COMPATIBLE WITH SCOPE 3.3 AND 3.4)

DEC	OCT	SEPARATOR
1	01	,
2	02	=
3	03	/
4	04	(
5	05	+
6	06	-
7	07	BLANK
8	10	;
14	16	OTHER
15	17	. OR) (TERMINATOR)

REMARKS
THE SUBROUTINE IS PRE-INITIALIZED FOR PROCESSING THE FIRST USER PARAMETER STRING. IF A SECOND STRING IS TO BE PROCESSED, THE SUBROUTINE MUST BE RE-INITIALIZED USING EITHER THE THIRD OR FOURTH FORM OF THE CALL.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
MINO
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 464B

AUTHORS
   C FLINK - KPS NWL
   D V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 06/73 - CF

DATE(S) REVISED
   04/11/74 - DVS - ORIGINAL SUBROUTINE 'EXPRM' MODIFIED TO
                    ACCEPT USER-SUPPLIED PARAMETER STRING

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL.ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'FBINRD'

PURPOSE
UNPACK AN INPUT ARRAY

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL FBINRD (BW, NUMB, IN, OUT)

DESCRIPTION OF PARAMETERS
BW - BITS-PER-WORD TO BE EXTRACTED
NUMB - NUMBER OF BW-BIT OUTPUT WORDS DESIRED
DIMENSION OF IN IS ((NUMB*BW)+59)/60
DIMENSION OF OUT IS NUMB
IN - INPUT ARRAY
OUT - OUTPUT ARRAY

CM REQUIRED: 35B

METHOD
THE BW EXTRACTED BITS ARE RIGHT JUSTIFIED WITH LEADING ZEROS IN OUT.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
A. CINCOTTA - DTNSRDC CODE 1892.3

DATE WRITTEN: 03/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'FFT'

PURPOSE
FAST FOURIER TRANSFORM FOR COMPLEX TABULATED FUNCTION

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THIS ROUTINE ALSO COMPUTES THE INVERSE FOURIER TRANSFORM. WITH SLIGHT MODIFICATIONS OF THE RESULTING TRANSFORM, TWO REAL TABULATED FUNCTIONS MAY BE TRANSFORMED SIMULTANEOUSLY.

FOR REAL, ONE-DIMENSIONAL DATA, SEE RFFT OR RFSN.

USAGE
CALL FFT (A, M, INV, S, IFSET, IFERR)

DESCRIPTION OF PARAMETERS

A - THE ARRAY CONTAINING A COMPLEX TABULATED FUNCTION OF UP TO 3 DIMENSIONS TO BE TRANSFORMED. 'A' CONTAINS CONSECUTIVE COMPLEX PAIRS OF DATA. FOR THE ARRAY A(I,J,K), THE ELEMENT WITH SUBSCRIPT (I,J,K) IS STORED WITH THE REAL PART IN SUBSCRIPT 2*((K*N1*N2)+(J*N1)+I)+1, AND THE IMAGINARY PART IN THE FOLLOWING CELL. N1 AND N2 ARE COMPUTED AS 2**M(1) AND 2**M(2), RESPECTIVELY. NOTE THAT 'I' VARIES MOST RAPIDLY, K LEAST RAPIDLY.
ON OUTPUT, 'A' CONTAINS THE FOURIER TRANSFORM.

M - A 3-CELL ARRAY WHICH CONTAINS THE MINIMUM INTEGER WHICH IS GE THE LOG-BASE-2 OF THE DIMENSIONS OF 'A'.

INV - SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'

S - SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'

IFSET - COMPUTATION FLAG
= 0 -- SET UP TABLES IN INV AND S
= 1 -- SET UP TABLES AND COMPUTE FOURIER TRANSFORM
=-1 -- SET UP TABLES AND COMPUTE INVERSE FOURIER TRANSFORM
= 2 -- COMPUTE FOURIER TRANSFORM ASSUMING TABLES EXIST
=-2 -- COMPUTE INVERSE FOURIER TRANSFORM ASSUMING TABLES EXIST

IFERR - RETURN CODE
= 0 -- NORMAL COMPLETION
<>0 -- ERRORS IN SUBROUTINE ARGUMENTS

NOTE: 3 ≤ M(L) ≤ 20, WHERE L IS THE SUBSCRIPT OF THE LARGEST ELEMENT IN M. DATA DIMENSIONS MUST BE POWERS OF 2. IF DATA DIMENSIONS ARE < 2**M(L), THE REMAINING LOCATIONS MUST BE SET TO ZERO OR ANY APPROPRIATE CONSTANT.

CM REQUIRED: 1510B

METHOD

THIS SUBROUTINE IS BASED ON AN ALGORITHM PROPOSED BY COOLEY AND TUKEY AND IS WELL DOCUMENTED IN REFERENCE 1. BASICALLY, THE ALGORITHM DECOMPOSES THE TRANSFORMATION INTO PRODUCT OF SEVERAL ELEMENTARY TRANSFORMATIONS FOLLOWED BY A REORDERING OF SUBSCRIPTS OF THE RESULT.

A METHOD EXISTS FOR TRANSFORMING 2 REAL DATA SETS SIMULTANEOUSLY WITH AN ELEMENTARY TANSFORMATION ON THE RESULTING ANSWERS TO SEPARATE THE TRANSFORMS. THIS PROCEDURE IS DOCUMENTED IN REFERENCE 2.

TWO OTHER ROUTINES RFFT AND RFSN ACCOMPLISH THE FAST FOURIER TRANSFORM AND INVERSE TRANSFORM, RESPECTIVELY, OF ONE-DIMENSIONAL DATA. THESE ROUTINES USE A MODIFICATION OF THE COOLEY-TUKEY PROCESS AND ARE FASTER THAN PROCESSING A COMPLEX ARRAY WITH A ZERO IMAGINARY COMPONENT.

REFERENCES

1. COOLEY, J. W., AND TUKEY, J. W., "AN ALGORITHM FOR THE MACHINE CALCULATION OF COMPLEX FOURIER SERIES," MATH. COMPUT. 19, 90 (APRIL 1965), 297-301.
2. SINGLETON, RICHARD C., "ON COMPUTING THE FAST FOURIER TRANSFORM," COMM. OF THE ACM, VOL. 10, NO. 10, OCTOBER 1967.
3. SYSTEM/360 SCIENTIFIC SUBROUTINE PACKAGE, IBM TECHNICAL PUBLICATONS DEPARTMENT, 1967.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

COS IABS MAXO SIN SQRT

OTHERS

NONE

AUTHORS

WES RICE
DUANE HARDER
LOS ALAMOS SCIENTIFIC LABORATORY

VIM ROUTINE LASL C329A

DATE WRITTEN: 07/16/68

DATE(S) REVISED

02/69 - DH

LOCATION OF DECKS

SOURCE

UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK LASC329)

OBJECT

EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'FFT5'

PURPOSE
FAST FOURIER TRANSFORM

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL FFT5 (F, NPTS, KOMPLX)

DESCRIPTION OF PARAMETERS
F - (COMPLEX) ARRAY TO BE TRANSFORMED
(IF 'F' IS REAL, THE VALUES MUST BE STORED IN
CONTIGUOUS CORE LOCATIONS)
NPTS - NUMBER OF WORDS IN 'F' TO BE TRANSFORMED.
MUST BE POWER OF 2 AND LE 8192.
TO COMPUTE THE INVERSE TRANSFORM, NPTS MUST
BE NEGATIVE.
KOMPLX - ONE OF:
0 - DATA IN 'F' IS REAL
1 - DATA IN 'F' IS COMPLEX

CM REQUIRED: 4521B (FFT5) (+ 230B FOR IRVING)

METHOD
SEE CMD-25-71

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
COS FLOAT IABS
PART OF PROGRAM
IRVING
OTHERS
NONE

AUTHORS
W. H. HAILE
GEORGE GLUCK

DATE WRITTEN: 1971

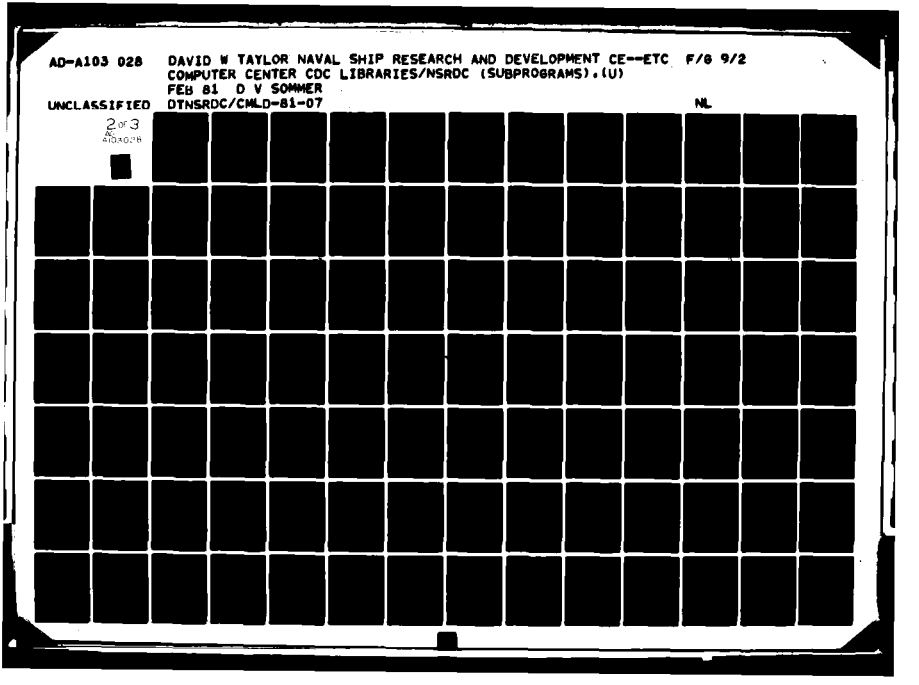
DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TAPE LABELLED CLIBRARYUPD3 (DECK: AMFFT5)
OBJECT
EDITLIB USER LIBRARY: NSRDC

AD-A103 028 DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CE--ETC F/G 9/2
COMPUTER CENTER CDC LIBRARIES/NSRDC (SUBPROGRAMS).(U)
FEB 81 D V SOMMER

UNCLASSIFIED DTNSRDC/CML-D-81-07 NL

2 OF 3
AD
A103028



SUBROUTINE 'FINDC'

PURPOSE
FIND PRESENCE OR ABSENCE OF SPECIFIED CHARACTER IN AN ARRAY (USER SPECIFIES RELATIONAL OPERAND)

FUNCTIONAL CATEGORIES: M5

USAGE
```
CALL FINDC (A, NA, CHAR, NC, NW, REL, FIRSTCH)
CALL FINDC (A, NA, CHAR, NC, NW, REL)
```

DESCRIPTION OF PARAMETERS

A	- ARRAY TO BE SEARCHED
NA	- NUMBER OF WORDS IN 'A' TO BE SEARCHED
CHAR	- CHARACTER TO BE SEARCHED FOR ACCORDING TO 'REL' (LEFT-ADJ, BLANK- OR ZERO-FILLED -OR- RIGHT-ADJ, ZERO-FILLED)
NC	- OUTPUT POSITION OF FIRST CHARACTER (RELATIVE TO START OF 'A') WHICH SATISFIES THE RELATION 'REL' -OR- 0 - CONDITION IS NOT SATISFIED -OR- -1 - 'REL' IS INVALID -2 - 'FIRSTCH' GT 10*NA
NW	- OUTPUT SUBSCRIPT OF WORD CONTAINING POSITION 'NC' -OR- 0 - CONDITION IS NOT SATISFIED -OR- -1 - 'REL' IS INVALID -2 - 'FIRSTCH' GT 10*NA
REL	- RELATIONAL OPERAND "EQ" - FIND FIRST CHARACTER IN 'A' EQUAL TO 'CHAR' "NE" - FIND FIRST CHARACTER IN 'A' NOT EQUAL TO 'CHAR' "LT" - FIND FIRST CHARACTER IN 'A' LESS THAN 'CHAR' "LE" - FIND FIRST CHARACTER IN 'A' LESS THAN OR EQUAL TO 'CHAR' "GT" - FIND FIRST CHARACTER IN 'A' GREATER THAN 'CHAR' "GE" - FIND FIRST CHARACTER IN 'A' GREATER THAN OR EQUAL TO 'CHAR'
FIRSTCH	- FIRST CHARACTER TO BE SEARCHED (OPTIONAL) (DEFAULT: 1) IF FRSTCH < 1, DEFAULT IS USED.

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
   OTHERS
      GETCHA - GET CHARACTER FROM ARRAY

ARITHMETIC STATEMENT FUNCTIONS
   L11FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
   L21FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
   R11FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 261B

AUTHORS
   DAVID V SOMMER - DTNSRDC CODE 1892.2
   PETE ROTH   - DTNSRDC CODE 1720.3

DATA WRITTEN: 04/20/76

DATE(S) REVISED
   07/22/76 - PR/DVS - ADD PARAMETER 'FIRSTCH'

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'FINDW'

PURPOSE
FIND PRESENCE OR ABSENCE OF SPECIFIED WORD IN AN ARRAY
(USER SPECIFIES RELATIONAL OPERAND)

FUNCTIONAL CATEGORIES: M5

USAGE
CALL FINDW (A, NA, W, NW, REL)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SEARCHED
NA - NUMBER OF WORDS IN 'A' TO BE SEARCHED
W - WORD TO BE TESTED FOR ACCORDING TO 'REL'
NW - OUTPUT POSITION (SUBSCRIPT) OF FIRST WORD IN 'A'
WHICH SATISFIES THE RELATION 'REL' -OR-
0 - CONDITION IS NOT SATISFIED -OR-
-1 - 'REL' IS INVALID
REL - RELATIONAL OPERAND
"EQ" - FIND FIRST WORD IN 'A' WHICH IS EQUAL TO 'W'
"NE" - FIND FIRST WORD IN 'A' WHICH IS NOT EQUAL TO 'W'
"LT" - FIND FIRST WORD IN 'A' WHICH IS LESS THAN 'W'
"LE" - FIND FIRST WORD IN 'A' WHICH IS LESS THAN OR EQUAL TO 'W'
"GT" - FIND FIRST WORD IN 'A' WHICH IS GREATER THAN 'W'
"GE" - FIND FIRST WORD IN 'A' WHICH IS GREATER THAN OR EQUAL TO 'W'

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 201B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 02/20/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'FINDWRD'
SUBROUTINE 'FINDWR'

PURPOSE
FIND SPECIFIED WORD IN AN ARRAY

FUNCTIONAL CATEGORIES: M5

LANGUAGE: FORTRAN IV

USAGE
CALL FINDWRD (A, NA, WORD, NWORD)
CALL FINDWR (A, NA, WORD, NWORD)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SEARCHED
NA - NUMBER OF WORDS IN 'A' TO BE SEARCHED
WORD - WORD TO BE SEARCHED FOR
NWORD - OUTPUT SUBSCRIPT OF FIRST OCCURRENCE OF WORD
IN 'A' (IF NO MATCH, ZERO (0) IS RETURNED)

REMARKS
ON CDC 6000, USE 'FINDWRD'. ON BURROUGHS B7700, USE
'FINDWR'. A CDC 6000 PROGRAM USING 'FINDWRD' NEED NOT
CHANGE WHN MOVING TO THE B7700, SINCE NAMES ARE TRUNCATED
TO 6 CHARACTERS AUTOMATICALLY.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

CM REQUIRED: B7700: EST 48 WORDS
CDC : 40B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 07/08/74

DATE(S) REVISED
05/07/79 - MOVE TO BURROUGHS B7700

LOCATION OF DECKS
SOURCE
B7700: *SOURCE/NSRDC/FINDWR
CDC : UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
B7700: *NSRDC/FINDWR
CDC : EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'FRESNEL'

PURPOSE
EVALUATE FRESNEL INTEGRALS

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS

C(X) = INTEGRAL (FROM 0 TO X) COS((PI/2)U**2)DU

S(X) = INTEGRAL (FROM 0 TO X) SIN((PI/2)U**2)DU

RELATIVE ERROR < 2.E-10.

USAGE
CALL FRESNEL (X, C, S)

DESCRIPTION OF PARAMETERS
X - REAL INPUT PARAMETER
C - REAL OUTPUT PARAMETER (C(X))
S - REAL OUTPUT PARAMETER (S(X))

CM REQUIRED: 271B

METHOD
TRUNCATED CHEBYSHEV SERIES

REFERENCE
BULRISCH, R., "NUMERICAL CALCULATION OF THE SINE, COSINE AND FRESNEL INTEGRALS", NUMERISCHE MATHEMATIK, 9, 1967, PP. 380-385.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS AINT COS FLOAT SIN
OTHERS
NONE

AUTHOR
R BULIRSCH - UNIVERSITY OF CALIFORNIA AT SAN DIEGO

DATE WRITTEN: 01/68

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TAPE LABELLED: CLIBRARYUPD3
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'FTNRFL'

PURPOSE
   GET/SET CORE SIZE

FUNCTIONAL CATEGORIES: Q0

USAGE
   CALL FTNRFL (IFL)

DESCRIPTION OF PARAMETER
   IFL - INTEGER FIELD LENGTH DESIRED.
         IF THE VALUE OF IFL IS ZERO (0), THE FL IS NOT CHANGED
         BUT THE PRESENT FIELD LENGTH IS RETURNED IN IFL.

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 20B

AUTHOR
   C FLINK - KPS NWL

DATE WRITTEN: 12/18/70

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

FUNCTION 'GAMCAR'

PURPOSE
COMPLEX GAMMA FUNCTION OF A COMPLEX ARGUMENT HAVING POSITIVE REAL PART

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
HAS BEEN CHECKED FOR CX = A + BI, $0<A\leq 20$, $0<B\leq 20$.
RELATIVE ERROR IS $\leq$ 2*10**-10.

USAGE
```
COMPLEX CX, CY, GAMCAR
  ...
CY = GAMCAR (CX)
```

DESCRIPTION OF PARAMETERS
CX - COMPLEX VARIABLE WITH POSITIVE REAL PART
CY - COMPLEX SOLUTION

CM REQUIRED: 233B

METHOD

$$\mathrm{GAMCAR}(Z+1) = (Z+5.5)^{(Z+1/2)} * E^{-(Z+5.5)} * \sqrt{2\pi} * (\mathrm{CONSTANT} + \sum_{I=1}^{6} (CI/Z+I))$$

WHERE

CONSTANT	=	1.00000 00001 78
C(1)	=	76.18009 17294 06
C(2)	=	-86.50532 03271 12
C(3)	=	24.01409 82222 3
C(4)	=	-1.23173 95161 4
C(5)	=	0.00120 85800 3
C(6)	=	-0.00000 53638 2

REFERENCES
C. LANCZOS, NUMERICAL ANALYSIS, SIAM SERIES B, VOL I, PP. 86-96, 1964.

HANDBOOK OF MATHEMATICAL FUNCTIONS, NATIONAL BUREAU OF STANDARDS, APPLIED MATHEMATICS SERIES NO. 55.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
CEXP CLOG
OTHERS
NONE

AUTHORS
R L PEXTON - LAWRENCE RADIATION LABORATORY
D A WILBER - LAWRENCE RADIATION LABORATORY

DATE WRITTEN: 12/16/64 (RLP)

DATE(S) REVISED
08/65 (DAW)

LOCATION OF DECKS
SOURCE
TAPE LABELLED: CLIBRARYUPD3
OBJECT
NSRDC

FUNCTION 'GAMMA'

PURPOSE
INCOMPLETE GAMMA FUNCTION

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
COMPUTES GAMMA (A, X) UNDER THE FOLLOWING RESTRICTIONS:
1) X >= 0,
2) WHEN X = 0, A IS NOT A NON-POSITIVE INTEGER.

USAGE
Y = GAMMA (A, X)

DESCRIPTION OF PARAMETERS
A - FLOATING POINT NUMBER
X - >= 0 (X=0 FOR COMPLETE GAMMA FUNCTION)

CM REQUIRED: 557B (INCLUDES GAMNEG/GCHEB/GFRAC/GSERIES)

REFERENCE
C. E. FROBERG, RATIONAL CHEBYCHEV APPROXIMATION OF ELEMENTARY FUNCTIONS, BIT, VOL. 1, P. 256, 1961.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS ALOG SQRT
PART OF PROGRAM
GAMNEG - COMPUTES GAMMA(A,X) WHEN A IS NEGATIVE INTEGER (DUE TO THE REPRESENTATION OF NUMBERS IN THE 6600, IF A=-N+-E, WHERE E<1.0E-10, THEN A IS TAKEN TO BE A NEGATIVE INTEGER)
GCHEB - COMPUTES BY A RATIONAL CHEBYSHEV APPROXIMATION (GAMMA(A))
GFRAC - COMPUTES THE CONTINUES FUNCTION FOR GAMMA(A,X)
GSERIES - COMPUTES SUM (N=0,INF) ((-X)**N)/((A+N)N|)
OTHERS
NONE

AUTHOR
HARVEY ABRAMSON - NEW YORK UNIVERSITY

DATE WRITTEN: 05/15/66

DATE(S) REVISED
05/67

LOCATION OF DECKS
SOURCE
CODE 1892.1
OBJECT
NSRDC

SUBROUTINE 'GAUSS'

PURPOSE
GAUSSIAN ELIMINATION WITH PARTIAL PIVOTING FOR SOLVING
AX=B WHERE B MAY BE A SYSTEM OF M RIGHT-HAND SIDES

FUNCTIONAL CATEGORIES: F4 F3

LANGUAGE: FORTRAN IV

REMARKS
IF A-INVERSE IS DESIRED; ANX=¢B IN! WILL YIELD
THE SOLUTION TO AX=B AS WELL AS THE INVERSE.

IF MM=0, XX CONTAINS RESULT OF FIRST GAUSSIAN ELIMINATION.

USAGE
CALL GAUSS (N, M, AA, BB, XX, VAL2, DET, MM)

DESCRIPTION OF PARAMETERS
N - SIZE OF MATRIX AA
M - NUMBER OF COLUMNS IN BB (<=51)
(NUMBER OF RIGHT HAND SIDES)
AA - MATRIX (51X51)
BB - RIGHT HAND SIDE(S) (51X51)
XX - SOLUTION VECTORS (51X51)
VAL2 - FINAL MAXIMUM ROW SUM OF RESIDUALS
(INFINITY-NORM OF RESIDUAL)
DET - DETERMINANT
MM - NUMBER OF ITERATIONS ON RESIDUALS
INPUT - MAXIMUM NUMBER TO BE PERMITTED
OUTPUT - NUMBER ACTUALLY DONE

CM REQUIRED: 17714B

REFERENCE:
WILKINSON, J. H., ROUNDING ERRORS IN ALGEBRAIC PROCESSES.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS
OTHERS
NONE

AUTHORS
ROBERT MARGOLIS - UNIVERSITY OF MARYLAND
SUSAN VOIGHT - DTNSRDC

DATE WRITTEN: 1971

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TAPE LABELLED: CLIBRARYUPD3 (DECKNAME: AMGAU2)
OBJECT
EDITLIB USER LIBRARY): NSRDC

SUBROUTINE 'GETCHA'
FUNCTION 'GETCHA'

PURPOSE
EXTRACT CHARACTER FROM SPECIFIED POSITION IN AN ARRAY

FUNCTIONAL CATEGORIES: M4 M5

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

USAGE
CALL GETCHA (ARRAY, NPOS, ICHAR)
VARIABLE = GETCHA (ARRAY, NPOS, ICHAR)

DESCRIPTION OF PARAMETERS
ARRAY - ARRAY FROM WHICH CHARACTER IS TO BE EXTRACTED
NPOS - POSITION OF CHARACTER TO BE EXTRACTED
(POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN
ARRAY(1))
ICHAR - WILL CONTAIN THE EXTRACTED CHARACTER IN 1R FORMAT
(RIGHT-ADJ, ZERO-FILLED)
GETCHA - WHEN USED AS A FUNCTION, GETCHA WILL CONTAIN THE
SAME AS ICHAR AND MUST BE DECLARED INTEGER IN THE
CALLING PROGRAM

CM REQUIRED: 52B

REMARKS
SIMILAR TO FUNCTION 'GETCHC' ON THE BURROUGHS B7700.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MOD SHIFT
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/16/76

DATE(S) REVISED
08/01/79 - DOCUMENT MODIFIED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'GETCHR'
FUNCTION 'GETCHR'

PURPOSE
EXTRACT CHARACTER FROM SPECIFIED POSITION IN A WORD

FUNCTIONAL CATEGORIES: M4 M5

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

USAGE
CALL GETCHR (WORD, NPOS, ICHAR)
VARIABLE = GETCHR (WORD, NPOS, ICHAR)

DESCRIPTION OF PARAMETERS
WORD - WORD FROM WHICH CHARACTER IS TO BE EXTRACTED
NPOS - POSITION OF CHARACTER TO BE EXTRACTED
(POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN WORD)
ICHAR - WILL CONTAIN THE EXTRACTED CHARACTER IN 1H FORMAT
(LEFT-ADJ, BLANK-FILLED)
GETCHR - WHEN USED AS A FUNCTION, GETCHR WILL CONTAIN THE
SAME AS ICHAR AND MUST BE DECLARED INTEGER IN THE
CALLING PROGRAM

CM REQUIRED: 43B

REMARKS
'GETCHA' ON THE BURROUGHS B7700 IS SIMILAR, BUT EXTRACTS
FROM AN ARRAY.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

AUTHOR
FROM BIMED PACKAGE

DATE WRITTEN: 03/16/76
1975 - DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE(S) REVISED
08/01/79 - DOCUMENT MODIFIED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'GETFIT'

PURPOSE
GET SPECIFIED FIT ADDRESS

FUNCTIONAL CATEGORIES: Q0

USAGE
CALL GETFIT (LFN, ADDR)

DESCRIPTION OF PARAMETERS
LFN - LOCAL FILE NAME
(LEFT-JUSTIFIED, ZERO-FILLED)
(E.G., 5LTAPE1)
ADDR - WILL CONTAIN THE FIT ADDRESS

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: COMPASS

CM REQUIRED: 25B

AUTHOR
ANTHONY CINCOTTA - NSRDC CODE 1892.3

DATE WRITTEN: 03/20/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

```
SUBROUTINE 'GETHOUR'

PURPOSE
   FOR A SPECIFIED PERIOD OF TIME (UP TO 2 HR 59 MIN 59 SEC)
   DETERMINE WHICH HOUR IS OCCUPIED THE LONGEST

FUNCTIONAL CATEGORIES:  M2

USAGE
   CALL GETHOUR (FROM, TO, HOUR)

DESCRIPTION OF PARAMETERS
   FROM - STARTING TIME ('HH.MM.SS  ', ' HH.MM.SS ' OR
          '  HH.MM.SS')
   TO   - STOPPING TIME (SAME FORMAT AS 'FROM')
   HOUR - WILL CONTAIN AN INTEGER HOUR
          0 - TIME PERIOD TOO LONG TO DETERMINE HOUR
          N - MOST/ALL TIME IS IN THE HOUR N-1 TO N
              (E.G., HOUR=8 MEANS MOST/ALL TIME IS IN
              THE HOUR 7-8)

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND        SHIFT
   OTHERS
      ISEC     - CONVERT HH.MM.SS TO SECONDS

ARITHMETIC STATEMENT FUNCTIONS
   I21FMT  - FAST I-FORMAT DECODE
   L11FMT  - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

METHOD
   THE HOURS IN FROM (HF) AND TO (HT) ARE COMPARED.
   IF EQUAL, HOUR IS SET TO HT+1.
   IF THE DIFFERENCE IS 1, THE AMOUNT OF TIME SPENT IN EACH
   HOUR IS COMPARED AND THE HOUR IS SET TO THE LARGER+1.
   IF AN EQUAL AMOUNT OF TIME IS SPENT IN EACH HOUR, HOUR IS
   SET TO HT+1.
   IF THE DIFFERENCE IS 2, HOUR IS SET TO THE MIDDLE HOUR+1.

CM REQUIRED: 121B
```

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 07/23/76

DATE(S) REVISED
   11/16/76

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'GETLFNS'

PURPOSE
GET ACTUAL LOCAL FILE NAMES (FOR FTN)

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
USEFUL ONLY IN FTN PROGRAMS (WHICH ALLOW FILE NAME REPLACEMENT IN THE 'LGO' CARD).

USAGE
```
CALL GETLFNS (LFNS, NLFN)
CALL GETLFNS (LFNS)
```

DESCRIPTION OF PARAMETERS
LFNS - ARRAY DIMENSIONED AT LEAST 1 GREATER THAN NUMBER OF FILES (INCLUDING EQUATED FILES) ON FTN PROGRAM STATEMENT
(LFNS(NLFN) WILL BE SET TO 0)
NLFN - IF PRESENT, WILL RETURN NUMBER OF FILE NAMES + 1 (SUBSCRIPT OF FINAL ZERO-WORD IN ARRAY LFNS)

CM REQUIRED: 33B

EXAMPLES
```
PROGRAM SAMPLE (INPUT,OUTPUT,TAPE1,TAPE5=INPUT,TAPE6=OUTPUT)
DIMENSION LFN(6)
CALL GETLFNS (LFN, NLFN)
   ...
```

EXECUTE CARD:	LGO.	LGO.,,OUT,TAPE2.
AFTER CALL:	LFN(1) = 5LINPUT	LFN(1) = 5LINPUT
	LFN(2) = 6LOUTPUT	LFN(2) = 3LOUT
	LFN(3) = 5LTAPE1	LFN(3) = 5LTAPE2
	LFN(4) = 5LINPUT	LFN(4) = 5LINPUT
	LFN(5) = 6LOUTPUT	LFN(5) = 3LOUT
	LFN(6) = 0	LFN(6) = 0
	NLFN = 6	NLFN = 6

METHOD
FILE NAMES FROM PROGRAM CARD ARE IN RA+2 ON. EACH HAS A POINTER TO ITS FIT. THE FIRST WORD OF EACH FIT IS THE ACTUAL FILE NAME. THE LIST, STARTING IN RA+2, ENDS IN A WORD OF ZEROS.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND   LOCF
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   L71FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
   R38FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 12/30/74

DATE(S) REVISED
   12/29/75
   10/20/77 - REWRITE TO REDUCE CM REQUIREMENT AND ELIMINATE
              SPECIAL FUNCTION CALL

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'GETLGO'

PURPOSE
   EXTRACT FIRST 10 CHARACTERS OF ALL EXECUTE CARD
   PARAMETERS

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   NONE

USAGE
   CALL GETLGO (LGO, NLGO)

DESCRIPTION OF PARAMETERS
   LGO - ARRAY TO CONTAIN EXECUTE CARD PARAMETERS
          LGO(1) CONTAINS EXECUTE NAME
          LGO(2)-LGN(NLGO) CONTAIN FIRST 10 CHARACTERS
          OF EACH PARAMETER (0 MEANS PARAMETER OMITTED)
   NLGO - NUMBER OF WORDS OF LGO FILLED

CM REQUIRED: 36B

METHOD
   PARAMETERS ARE EXTRACTED FROM RA+70B THRU RA+77B.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      EXPRM   - GET NEXT PARAMETER FROM EXECUTE CARD

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 09/01/77

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

FUNCTION 'GETLIB'

PURPOSE
GET SYSTEM LIBRARY NAME FROM CODE IN CONTROL POINT AREA

FUNCTIONAL CATEGORIES: M5 S0 Q0

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

REMARKS
THIS ROUTINE MUST BE REVERIFIED EACH TIME THE NOS/BE SYSTEM CHANGES.

USAGE
```
INTEGER GETLIB
LIB = GETLIB (WHICH)
```

DESCRIPTION OF PARAMETERS
```
WHICH   - CONTAINS A 1-CHARACTER CODE FOR THE LIBRARY
          (THIS IS IN CONTROL POINT AREA + 055B THRU 057B)
GETLIB  - WILL CONTAIN ONE OF:
          -1         -- 'WHICH' WAS INVALID
          0          -- END OF THE LIBRARY LIST
          <LIB>      -- A SYSTEM LIBRARY NAME (1-7 CHARACTERS)
          <BLANKS>   -- THE USER LIBRARY NAME IS IN CPA+056B
                        OR 057B
```

CM REQUIRED: 44B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
```
PART OF LANGUAGE
   NONE
OTHERS
   NONE
```

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 09/24/80

DATE(S) REVISED
02/06/81 - REMOVE RUN2P3 AND RE-ARRANGE

LOCATION OF DECKS
```
SOURCE
   UPDATE LIBRARY:   NSRDCPL,ID=CSYS
OBJECT
   EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'GETRA'

PURPOSE
   GET FIRST 100B WORDS OF USER'S FL

FUNCTIONAL CATEGORIES: K2

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
   NONE

USAGE
   CALL GETRA (RA)

DESCRIPTION OF PARAMETER
   RA - 64-WORD ARRAY TO HOLD FIRST 100B WORDS OF FL

CM REQUIRED: 7B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/03/73

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'GODROP'

PURPOSE
CREATE GO/DROP MESSAGE AND PROCESS RESPONSE

FUNCTIONAL CATEGORIES: QO

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NOT DESIGNED FOR BATCH JOBS.

IN INTERCOM, WILL GENERATE MESSAGE AT THE TERMINAL, NOT AT THE CENTRAL SITE CONSOLE.

WHEN USED WITH NO ARGUMENT LIST, THE 'Z' PARAMETER MUST BE USED ON THE FTN CARD.

USAGE
```
CALL GODROP (MESSAGE)
CALL GODROP
```

DESCRIPTION OF PARAMETER
MESSAGE - IF USED, CONTENTS WILL BE DISPLAYED (SHOULD BE A ZERO-BYTE TERMINATED FIELD)
IF OMITTED, THE MESSAGE IS TAKEN FROM RA+70B THRU RA+77B AND PREFIXED WITH 'GO/DROP- '. THE MESSAGE MAY BE INSERTED BY
'CALL PUTRA (MESSAGE, 70B, 76B)'

CM REQUIRED: 142B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF REMARK
OTHERS
MFETCH - READ A WORD IN USER'S FL
MSET - SET WORD IN USER'S FL

AUTHOR
C FLICK - KPS NWL

DATE WRITTEN: 06/73

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'HELP'

PURPOSE
COMPLEX ROOTS OF A REAL OR COMPLEX POLYNOMIAL

FUNCTIONAL CATEGORIES: C2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
CALCULATES THE ROOTS OF THE COMPLEX POLYNOMIAL
FN(Z) = A(N)*Z**(N) + A(N-1)*Z**(N-1) + ... + A(1)*Z + A(0)
WHERE A(I) (I=0,1,...,N) ARE PSEUDO-COMPLEX COEFFICIENTS.

USAGE
CALL HELP (N, A, ROOT, TAU, ETAI, MI)

DESCRIPTION OF PARAMETERS

N	- DEGREE OF POLYNOMIAL (DESTROYED BY HELP)
A	- ARRAY OF N+1 COEFFICIENTS (SEE NOTE) (DESTROYED BY HELP)
ROOT	- ARRAY TO CONTAIN THE N ROOTS (SEE NOTE)
TAU	- THE TOLERANCE TO BE PRESCRIBED FOR FN(ROOT(I)) (ROOT(I) WOULD BE CONSIDERED AS A ROOT WHEN ABS(FN(ROOT(I))) <= TAU IN THE SCALE OF THE SYSTEM OF COORDINATES CONSIDERED AT THE MOMENT)
ETAI	- INDICATOR ARRAY ETAI(I)=+1 -- ABS(FN(ZI)) <= TAU = 0 -- DID NOT FIND A NEW CIRCLE =-1 -- INCREMENTING THE ROOT BY NU DID NOT CHANGE THE ROOT (BECAUSE OF MACHINE LIMITS)
MI	- INDICATOR VECTOR

NOTE: ARRAYS 'A' AND 'ROOT' ARE 2-DIMENSIONAL REAL ARRAYS A(N+1,2), ROOT(N,2), WHERE A(I,1), ROOT(I,1) ARE THE REAL PARTS AND A(I,2), ROOT(I,2) ARE THE IMAGINARY PARTS.

CM REQUIRED: 1471B

METHOD
THE METHOD OF D. H. LEHMER (JOURNAL ACM, 1961, VOL 8, P. 151) IS USED.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      ABS   SIN   SQRT
   PART OF PROGRAM
      ANSWER (437B)
      ANULUS (117B)
      COMADD (13B)
      COMMUL (14B)
      DIVIDE (52B)
      FUNC   (53B)
      OVRLAP (214B)
   OTHERS
      NONE

AUTHORS
   ADEL S. ABDELGAWAD
   G. MIEDEL
   DEUTSCHES RECHENZENTRUM

   SHARE PROGRAM NUMBER 3400

DATE WRITTEN: 11/64

DATE(S) REVISED
   11/18/65 - GM

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
                                        (*DECK ZFHELP)
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

```
SUBROUTINE 'HERE'
FUNCTION 'HERE'

PURPOSE
   GET TERMINAL ID FOR THIS JOB

FUNCTIONAL CATEGORIES:  Q0

USAGE
   CALL HERE (I)
   VARIABLE = HERE (I)

DESCRIPTION OF PARAMETERS
   I - WILL CONTAIN THE TERMINAL ID, LEFT-JUSTIFIED,
       ZERO-FILLED (1LC = CENTRAL SITE)
      (WHEN USED AS A FUNCTION, 'HERE' WILL CONTAIN THE SAME AS
      'I'.  'VARIABLE' AND 'HERE' MUST BE OF THE SAME TYPE.)

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND        SHIFT
   OTHERS
      RCPA     - READ CONTROL POINT AREA
      UNHEX3   - CONVERT 2-CHAR DISPLAY CODE TO 3-CHAR HEX

ARITHMETIC STATEMENT FUNCTIONS
   L25FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV EXTENDED

METHOD
   THE TERMINAL ID IS TAKEN FROM CONTROL POINT AREA.
   IF THIS FIELD IS ZERO, IT IS A CENTRAL SITE JOB.  IN THIS
   CASE, 1LC IS RETURNED.

CM REQUIRED: 31B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/05/75

DATE(S) REVISED
   10/01/78 - CHANGE FOR 3-CHARACTER TERMINAL ID

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

FUNCTION 'HEX3'

PURPOSE
SQUEEZE 3-CHARACTER HEX INTO 12 BITS

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
'HEX3' IS AN INTEGER FUNCTION.

WRITTEN TO CHANGE USER-SUPPLIED 3-CHARACTER HEX TERMINAL ID TO THE FORM NEEDED BY THE CALLABLE ROUTE.

USAGE
I = HEX3 (HEXVAL)

DESCRIPTION OF PARAMETERS
HEXVAL - INPUT HEX VALUE (E.G., 3LF04)
HEX3 - OUTPUT IN FIRST 2 CHARACTERS (E.G., 2L@D)

CM REQUIRED: 60B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND OR SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)
R11FMT R12FMT R13FMT

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 09/19/78

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

FUNCTION 'IAOC'

PURPOSE
COUNT ONE-BITS IN SPECIFIED WORD

FUNCTIONAL CATEGORIES: G6

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
NONE

USAGE
N = IAOC (I)

DESCRIPTION OF PARAMETERS
I - WORD TO BE PROCESSED
IAOC - NUMBER OF ONE-BITS

CM REQUIRED: 2B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
FROM NWL

DATE WRITTEN:

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'IBL'
FUNCTION 'IBL'

PURPOSE
CALCULATE BEST BLOCK LENGTH (MIN TIME REQ'D FOR RANDOM ACCESS AND MINIMUM BUFFER SIZE) FOR INDEX SEQUENTIAL FILES

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV

REMARKS
THIS SUBROUTINE CALCULATES BEST BLOCK LENGTHS FOR INDEX SEQ FILES BASED ON EITHER VALUES ESTABLISHED IN A FIT OR A SIX WORD TABLE. IF INPUT IS A FIT, THIS ROUTINE WILL SET FIT FIELDS MBL AND IBL TO THE VALUE IT CALCULATES. A SHORT (5 LINE) REPORT CAN BE PRINTED DEPENDING ON THE VALUE OF THE SECOND PARAMETER PASSED TO IBL.

SEVERAL ASSUMPTIONS ARE MADE IN DERIVING THE FORMULA THIS SUBROUTINE USES. AMONG THESE ARE:

1. GENERAL INDEX-SEQ PROCESSING IS ASSUMED. IF THE FILE IS PROCESSED RANDOMLY ONLY, FILE ORGANIZATIONS OTHER THAN INDEX-SEQ PROVIDE BETTER PERFORMANCE. IF THE FILE IS ACCESSED HEAVILY SEQUENTIALLY THIS CALCULATION MAY NOT PROVIDE THE OPTIMUM SIZE.

2. EQUAL LENGTH DATA AND INDEX BLOCKS ARE ASSUMED TO ALLOW SHARING OF BUFFER AREAS.

3. BLOCK SIZE SHOULD BE OF MINIMAL LENGTH WHICH ALLOWS THE FILE TO BE FILLED TO CAPACITY INCLUDING PADDING.

4. BUFFER SPACE IS KEPT NEARLY MINIMAL AND RANDOM ACCESS TIME IS KEPT NEARLY MINIMAL.

THE ROUTINE IS BASED ON AN ARTICLE PUBLISHED IN CONTROL DATA PSI EXCERPTS (NO. 109 - OCTOBER 1977).

THE ROUTINE CANNOT BE USED IF RESULTING BLOCK LENGTH IS SMALLER THAN MAX REC LENGTH. IT SHOULD NOT BE USED IF RECORD TRUNCATION RESULTS IN EXCESSIVE PADDING IN THE DATA BLOCKS.

THE TIMINGS IN THE OUTPUT REPORT ARE BASED ON THE ASSUMPTION OF:

ACCESS TIME (POSITION + LATENCY)	=	30 MS
TRANSFER TIME	=	1 MS/PRU
CP TIME TO PROCESS THE REQUEST	=	1 MS

SO TOTAL TIME = 1 + (NO. INDEX LEVELS)*(30+NPRUS)

```
USAGE
   FORTRAN CALLING SEQUENCES
      CALL IBL (FIT, IFLAG)
      IBLKSZ = IBL (FIT, IFLAG)

   COBOL CALLING SEQUENCE
      ENTER IBL USING FIT, IFLAG.

      FIT      - FILE INFORMATION TABLE  -OR-
                 A SIX-WORD INTEGER ARRAY CONTAINING:
                    FLM   MAX RECORDS IN THE FILE
                    RL    AVERAGE RECORD LENGTH
                    KL    KEY LENGTH
                    IP    INDEX PADDING PERCENT
                    DP    DATA PADDING PERCENT
                    MRL   MAX RECORD LENGTH
      IFLAG    - PRINTOUT FLAG
                 "Y"    - PRINT 5-LINE REPORT
                 OTHER - DO NOT PRINT
      IBL      - WHEN USED AS A FORTRAN FUNCTION, IBL RETURNS
                 THE COMPUTED BLOCK SIZE

CM REQUIRED:  363B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      IFETCH    STOREF
   OTHERS
      NONE

AUTHOR
   ACQUIRED FROM AUTHOR OF CDC PSI ARTICLE
   MODIFIED BY BRUCE D. BLACK - DTNSRDC CODE 1892.1  (CDC)

DATE WRITTEN: 04/03/78

DATE(S) REVISED
   04/03/78 - ADD OPTION TO TURN OFF PRINT OF REPORT

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'IBUNP'

PURPOSE
   UNPACK 12-BIT BYTES FROM ARRAY

FUNCTIONAL CATEGORIES: M4

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
   NONE

USAGE
   CALL IBUNP (A1, A2, N)

DESCRIPTION OF PARAMETERS
   A1 - INPUT ARRAY FROM WHICH BYTES ARE UNPACKED
   A2 - OUTPUT ARRAY INTO WHICH BYTES ARE PLACED,
        1 BYTE PER WORD, RIGHT JUSTIFIED, WITH LEADING ZEROS
   N - NUMBER OF CDC WORDS TO UNPACK
        DIMENSION OF A1 IS   N
        DIMENSION OF A2 IS 5*N

CM REQUIRED: 12B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

AUTHOR
   FROM NWL

DATE WRITTEN:

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

```
FUNCTION   'IDAYWEK'

PURPOSE
   DETERMINE THE DAY OF THE WEEK FOR ANY DATE FROM 10/15/1582
   THRU 02/28/4000

FUNCTIONAL CATEGORIES:  G6

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   NONE

USAGE
   IDAY = IDAYWEK (IDATE, ICENT)
   IDAY = IDAYWEK (IDATE)

DESCRIPTION OF PARAMETERS
   IDATE    - DATE TO BE PROCESSED ('MM/DD/YY  ' OR ' MM/DD/YY '
              OR '  MM/DD/YY')
              (IF IDATE = 0, TODAY'S DATE WILL BE USED; IDATE
              WILL BE SET TO TODAY'S DATE ' MM/DD/YY ')
   ICENT    - CENTURY (E.G., 1900)
              IF OMITTED, 1900 IS ASSUMED.
   IDAYWEK  - WILL CONTAIN THE DAY OF THE WEEK IN A-FORMAT
              (E.G., 'SUNDAY    ')

CM REQUIRED: 104B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND        DATE       LOCF       SHIFT
   OTHERS
      WEKDAY   - DETERMINE DAY OF WEEK

ARITHMETIC STATEMENT FUNCTIONS
   FAST I-FORMAT DECODE
      I21FMT     I24FMT     I27FMT
   FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
      L11FMT

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/06/77

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:    NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:    NSRDC
```

```
SUBROUTINE 'IDID'
FUNCTION   'IDID'

PURPOSE
   GET USER INITIALS (AND INTERCOM USER ID) FROM CHARGE CARD
   OR LOGIN

FUNCTIONAL CATEGORIES:  Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   IF USER INITIALS AND USER ID ARE EQUAL, IT IS A BATCH JOB.

USAGE
   CALL IDID (ID, IUSERID)
   CALL IDID (ID)
   IID = IDID (ID, IUSERID)
   IID = IDID (ID)

DESCRIPTION OF PARAMETERS
   ID       - WILL CONTAIN 4-CHARACTER USER INITIALS FROM
              CHARGE CARD OR START OF LOGIN
   IUSERID - WILL CONTAIN 4-CHARACTER USER INITIALS FROM
              CHARGE CARD OR UP TO 10-CHARACTER USER ID
              FROM LOGIN
              (IF ID = IUSERID, IT IS A BATCH JOB)
   WHEN USED AS A FUNCTION, THE CONTENTS OF ID IS ALSO RETURNED
   AS THE FUNCTION VALUE.

CM REQUIRED: 27B

METHOD
   THE ID IS TAKEN FROM THE CONTROL POINT AREA.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
   OTHERS
      RCPA     - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
   L41FMT  - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/28/77

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

```
FUNCTION   'IDIGIT'

PURPOSE
   CHECK FOR DIGITS IN A FIELD WITHIN A WORD

FUNCTIONAL CATEGORIES:  M5

USAGE
   IDIGIT (I, ISTART, ISTOP)
   IDIGIT (I, ISTART)
   IDIGIT (I)

DESCRIPTION OF PARAMETERS
   I      - WORD TO BE ANALYZED
   ISTART - STARTING POSITION OF FIELD TO BE CHECKED
            (1-10, DEFAULT: 1)
   ISTOP  - STOP POSITION OF FIELD TO BE CHECKED
            (1-10, DEFAULT: 10)
            (TESTING WILL STOP IF 00B ENCOUNTERED)

REMARKS
   THE VALUE RETURNED IS ONE OF THE FOLLOWING:
      -11 - ERROR - ISTOP < ISTART
       -N - ERROR - START NON-DIGIT FOUND IN POSITION N
        0 - ALL POSITIONS IN FIELD ARE DIGITS
       +N - 00B FOUND IN POSITION N
            ALL PRECEDING CHARACTERS ARE DIGITS

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
      MAX0
      MIN0
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 76B

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 05/13/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'IFINDCH'
FUNCTION 'IFINDCH'

PURPOSE
FIND FIRST OCCURRENCE OF SPECIFIED CHARACTER IN ARRAY

FUNCTIONAL CATEGORIES: M5

LANGUAGE: FORTRAN IV

USAGE
```
CALL IFINDCH (A, NA, CHAR, NC, NW)
NC = IFINDCH (A, NA, CHAR, NC, NW)
NC = IFINDCH (A, NA, CHAR)
```

DESCRIPTION OF PARAMETERS
```
A    - ARRAY TO BE SEARCHED
NA   - NUMBER OF WORDS IN 'A' TO BE SEARCHED
CHAR - CHARACTER TO BE SEARCHED FOR (1R FORMAT)
NC   - OUTPUT POSITION OF FIRST OCCURRENCE OF CHAR IN 'A'
       (IF NO MATCH, ZERO (0) IS RETURNED)
NW   - OUTPUT SUBSCRIPT OF WORD IN 'A' CONTAINING CHAR
       (IF NO MATCH, NW IS SET TO NA)
```

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
```
PART OF LANGUAGE
   LOCF
OTHERS
   GETCHA  - GET CHARACTER FROM ARRAY
```

CM REQUIRED: 100B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/20/76

DATE(S) REVISED
11/02/76 - CHANGE TO FUNCTION AND SUBROUTINE

LOCATION OF DECKS
```
SOURCE
   UPDATE LIBRARY:   NSRDCPL,ID=CSYS
OBJECT
   EDITLIB USER LIBRARY:   NSRDC
```

FUNCTION 'IFMTV'

PURPOSE
FAST I-FORMAT DECODE OF VARIABLE LENGTH INPUT (UNSIGNED, POSITIVE INTEGER)

FUNCTIONAL CATEGORIES: I4

USAGE
IFMTV (I)

DESCRIPTION OF PARAMETER
I - SINGLE WORD CONTAINING NUMBER TO BE DECODED;
1-10 DIGITS, LEFT-JUSTIFIED, ZERO-PADDED;
A NON-DIGIT EMBEDDED IN THE FIELD WILL RETURN -1
(EG, 3L987 WILL RETURN THE INTEGER 987;
6L9 7654 WILL RETURN -1 (EMBEDDED BLANK))

REMARKS
USEFUL IN DECODING INTEGERS PASSED AS ARGUMENTS IN THE EXECUTE STATEMENT FOR A FTN PROGRAM.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

LANGUAGE: FORTRAN IV EXTENDED

CM REQUIRED: 27B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/74

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

FUNCTION 'IHMS'

PURPOSE
   CONVERT SECONDS TO ' HH.MM.SS.'

FUNCTIONAL CATEGORIES: M2

USAGE
   IHMS (ISEC)

DESCRIPTION OF PARAMETER
   ISEC - TIME (IN SECONDS) TO BE CONVERTED

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      OR   SHIFT
   OTHERS
      NONE

CM REQUIRED: 44B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 05/08/74

DATE(S) REVISED

FUNCTION 'IPAKLFT'

PURPOSE
SQUEEZE LEFT AND REMOVE ZEROS (00B) AND BLANKS (55B), RETURN NUMBER OF CHARACTERS

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
IF ANY BLANKS OR ZEROS WERE REMOVED, THE ARRAY IS PADDED WITH TRAILING ZEROS

USAGE
```
NCHAR = IPAKLFT (A)
NCHAR = IPAKLFT (A, NA)
```

DESCRIPTION OF PARAMETERS
```
A       - ARRAY TO BE PROCESSED
NA      - NUMBER OF WORDS TO BE PROCESSED
          (OMITTED = 1)
IPAKLFT - NUMBER OF NON-BLANK (NON-ZERO) CHARACTERS AFTER
          PROCESSING
```

CM REQUIRED: 107B

EXAMPLE
```
DIMENSION A(3)
DATA A/ "THIS  IS   A SAMPLE FIELD"/
NCHAR = IPAKLFT (A, 3)
...
```
AFTER EXECUTION: 'A' = 18LTHISISASAMPLEFIELD, IPAKLFT = 18

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
```
PART OF LANGUAGE
   LOCF
OTHERS
   GETCHA  - GET A CHARACTER
   PUTCHA  - PUT A CHARACTER
```

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 07/25/77

DATE(S) REVISED

LOCATION OF DECKS
```
SOURCE
   UPDATE LIBRARY:   NSRDCPL.ID=CSYS
OBJECT
   EDITLIB USER LIBRARY:   NSRDC
```

FUNCTION 'IROMAN'

PURPOSE
CONVERT ROMAN NUMBERS TO INTEGER

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV

REMARKS
VALIDITY OF THE ROMAN NUMBER IS NOT CHECKED. INVALID ROMAN NUMERALS ARE IGNORED. ROMAN NUMBER ENDS WHEN FIRST BLANK OR 00B IS ENCOUNTERED.

USAGE
IVAR = IROMAN (NUMBER)

DESCRIPTION OF PARAMETERS
IROMAN - WILL CONTAIN INTEGER EQUIVALENT OF SUPPLIED ROMAN NUMBER
NUMBER - ROMAN NUMBER TO BE CONVERTED

CM REQUIRED: 1316

EXAMPLES
MCMLXXVI WILL RETURN THE INTEGER 1976
I " " " " 1
ETC.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
GETCHA - EXTRACT CHARACTER FROM AN ARRAY

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/02/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

FUNCTION 'ISEC'

PURPOSE
CONVERT HH.MM.SS TO SECONDS

FUNCTIONAL CATEGORIES: M2

USAGE
ISEC (ITIME)

DESCRIPTION OF PARAMETER
ITIME - TIME TO BE CONVERTED
(MAY BE 'HH.MM.SS. ', ' HH.MM.SS.', OR ' HH.MM.SS')

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
FAST I-FORMAT DECODE
I21FMT I24FMT I27FMT
FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
L11FMT

CM REQUIRED: 40B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 05/01/74

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

FUNCTION 'ISITCNF'

PURPOSE
SEE IF SPECIFIED FILE IS CONNECTED

FUNCTIONAL CATEGORIES: Q0

USAGE
ISITCNF (I)

DESCRIPTION OF PARAMETER
I - FILE TO BE CHECKED (EG, 5LTAPE1)

REMARKS
THE FILE BEING TESTED MUST BE OPENED BEFORE USING
THIS FUNCTION. FOR FORTRAN LFN'S, THIS IS ACCOMPLISHED
BY ANY I/O OPERATION OR CALL CONNEC OR CALL DISCON.

THE VALUE RETURNED WILL BE ONE OF:
+1 - FILE IS CONNECTED
0 - FILE IS NOT CONNECTED
-1 - ERROR - FILE NOT FOUND
-2 - ERROR - I = 0

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
MFETCH - GET SPECIFIED WORD IN USER'S FIELD LENGTH

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

METHOD
BIT 44 OF WORD 10 (11TH WORD) OF FIT IS EXTRACTED.

CM REQUIRED: 54B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 05/02/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

FUNCTION 'ISTAPE'

PURPOSE
  GENERATE TAPE NAME 'TAPENN'

FUNCTIONAL CATEGORIES: M4

USAGE
  NAME = ISTAPE (NN)

DESCRIPTION OF PARAMETERS
  NAME - RESULTANT DISPLAY CODE NAME 'TAPENN'
         (LEFT-JUSTIFIED, ZERO-FILLED)
         (5LTAPEN OR 6LTAPENN)
  NN   - FORTRAN LOGICAL UNIT NUMBER

REMARKS
  NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
  PART OF LANGUAGE
    NONE
  OTHERS
    NONE

LANGUAGE: CDC 6000 CP COMPASS

CM REQUIRED: 23B

AUTHOR
  NWL

DATE WRITTEN: ?

DATE(S) REVISED

LOCATION OF DECKS
  SOURCE
    UPDATE LIBRARY: NSRDCPL,ID=CSYS
  OBJECT
    EDITLIB USER LIBRARY: NSRDC

FUNCTION 'ISUMIT'

PURPOSE
SUM ELEMENTS OF INTEGER ARRAY

FUNCTIONAL CATEGORIES: A1

LANGUAGE: FORTRAN IV

REMARKS
NONE

USAGE
ITOTAL = ISUMIT (IARRAY, N)

DESCRIPTION OF PARAMETERS
ISUMIT - WILL CONTAIN IARRAY(1)+IARRAY(2)+...+IARRAY(N)
IARRAY - ARRAY TO BE SUMMED
N - NUMBER OF ELEMENTS OF IARRAY TO BE SUMMED

CM REQUIRED: 16B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/23/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'JGDATE'

PURPOSE
CONVERT ANY GREGORIAN DATE TO A RELATIVE JULIAN DATE OR VICE VERSA (FOR MULTI-YEAR COMPUTATIONS)

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
JG=1 IS VALID FOR ANY GREGORIAN DATE PRODUCING A RELATIVE JULIAN DATE GREATER THAN ZERO.

THIS SUBROUTINE IS USEFUL IN DETERMINING THE ELAPSED NUMBER OF DAYS BETWEEN ANY TWO CALENDAR DATES. IT CAN ALSO BE USED TO FIND THE CALENDAR DATE SO MANY DAYS FROM ANY GIVEN DATE.

THE RELATIVE JULIAN DATE CORRESPONDING TO A GREGORIAN DATE HAS MEANING TO THIS SUBROUTINE ONLY. IT REPRESENTS THE NUMBER OF DAYS SINCE 11/24/-4713 (EXTRAPOLATING THE GREGORIAN CALENDAR).

SEE ALSO SUBROUTINE 'JULIAN' FOR DAY-OF-YEAR DETERMINATION.

USAGE
CALL JGDATE (JG, JD, IGY, IGM, IGD)

DESCRIPTION OF PARAMETERS
JG - DIRECTION OF CONVERSION
1 - GREGORIAN TO RELATIVE JULIAN
2 - RELATIVE JULIAN TO GREGORIAN
JD - RELATIVE JULIAN DATE (OUT IF JG=1, IN IF JG=2)
IGY - GREGORIAN YEAR (EG, 1975) (IN IF JG=1, OUT IF JG=2)
IGM - GREGORIAN MONTH (1-12) (IN IF JG=1, OUT IF JG=2)
IGD - GREGORIAN DAY (1-31) (IN IF JG=1, OUT IF JG=2)

CM REQUIRED: B7700: CORE: EST 96 WORDS; STACK: EST 3 WORDS
CDC : 71B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

METHOD
   SEE COMM. OF THE ACM, VOL. 11, NO. 10, OCT 1968, PAGE 657.

AUTHOR
   ?

DATE WRITTEN: 1968 OR EARLIER

DATE(S) REVISED
   03/01/79 - IMPLEMENT ON B7700

LOCATION OF DECKS
   SOURCE
      B7700: *SOURCE/NSRDC/JGDATE
      CDC : UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      B7700: *NSRDC/JGDATE
      CDC : EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'JOBNAME'
FUNCTION 'JOBNAME'

PURPOSE
GET SYSTEM JOB NAME FOR THIS JOB

FUNCTIONAL CATEGORIES: Q0

USAGE
CALL JOBNAME (I)
VARIABLE = JOBNAME (I)

DESCRIPTION OF PARAMETERS
JOBNAME - WILL CONTAIN JOB NAME, LEFT-JUSTIFIED,
ZERO-FILLED (WHEN USED AS FUNCTION)
I - WILL CONTAIN JOB NAME, LEFT-JUSTIFIED,
ZERO-FILLED

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
RCPA - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

METHOD
THE JOB NAME IS TAKEN FROM THE FIRST 7 CHARACTERS OF
CONTROL POINT AREA + 25B

CM REQUIRED: 25B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/04/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

```
FUNCTION   'JOBORG'
SUBROUTINE 'JOBORG'

PURPOSE
   DETERMINE JOB ORIGIN

FUNCTIONAL CATEGORIES:  Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   NONE

USAGE
   IVAR = JOBORG (I, IA)
   IVAR = JOBORG (I)
   CALL JOBORG (I, IA)
   CALL JOBORG (I)

DESCRIPTION OF PARAMETERS
   I  - WILL CONTAIN ONE OF THE FOLLOWING:
        1 - IF CALLING JOB IS A BATCH JOB
        2 - FOR REAL TIME JOB
        3 - FOR GRAPHICS JOB
        4 - FOR MULTI-USER JOB
        5 - FOR INTERCOM
   IA - IF SPECIFIED, WILL CONTAIN: 'BATCH', 'REAL TIME',
        'GRAPHICS', 'MULTI-USER', OR 'INTERCOM', ACCORDING
        TO THE VALUE OF 'I'.

   IF USED AS A FUNCTION, 'JOBORG' WILL RETURN THE SAME VALUE
   AS 'I'.

CM REQUIRED: 35B

METHOD
   THE INFORMATION IS TAKEN FROM THE CONTROL POINT AREA.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND
   OTHERS
      RCPA    - READ CONTROL POINT AREA

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/07/77

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'JULIAN'

PURPOSE
CONVERT ANY GREGORIAN DATE TO A JULIAN DAY-OF-YEAR OR VICE VERSA (FOR SINGLE YEAR COMPUTATIONS ONLY)

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
THE PARAMETER 'IGY' IS ALWAYS INPUT.

IF JG=1 AND (GM<1 OR GM>12 OR GD<1 OR GD>31), THEN JD IS SET TO ZERO (0).

IF JG=2 AND (JD<1 OR JD>366), THEN GM IS SET TO ZERO (0).

IF JG IS NOT 1 OR 2, THEN JD AND GM ARE SET TO ZERO (0).

SEE ALSO SUBROUTINE 'JGDATE' FOR MULTI-YEAR COMPUTATIONS.

USAGE
CALL JULIAN (JG, JD, IGY, IGM, IGD)

DESCRIPTION OF PARAMETERS
JG - DIRECTION OF CONVERSION
1 - GREGORIAN TO JULIAN
2 - JULIAN TO GREGORIAN
JD - JULIAN DAY-OF-YEAR (1-366)
IGY - GREGORIAN YEAR (E.G., 1968, ALWAYS INPUT)
IGM - GREGORIAN MONTH (1-12)
IGD - GREGORIAN DAY (1-31)

CM REQUIRED: B7700: CORE: EST 144 WORDS; STACK: EST 5 WORDS
CDC : 137B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MOD
   OTHERS
      NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 1968

DATE(S) REVISED
   04/26/73 - REWRITTEN IN FORTRAN FOR CDC 6000 - DVS
   06/21/76
   01/11/78
   03/01/79 - IMPLEMENTED ON B7700

LOCATION OF DECKS
   SOURCE
      B7700:   *SOURCE/NSRDC/JULIAN
      CDC :   UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      B7700:   *NSRDC/JULIAN
      CDC :   EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'KUTMER'

PURPOSE
INTEGRATE A SYSTEM OF FIRST-ORDER ORDINARY DIFFERENTIAL EQUATIONS USING THE KUTTA-MERSON FOURTH-ORDER, SINGLE-STEP METHOD

FUNCTIONAL CATEGORIES: D2

USAGE
CALL KUTMER (N, T, Y, EPS, H, FIRST, HCX, A)

DESCRIPTION OF PARAMETERS
N - NUMBER OF EQUATIONS (I.E., THE NUMBER OF COMPONENTS IN Y-BAR
T - THE INDEPENDENT VARIABLE, T
Y - THE ARRAY OF DEPENDENT VARIABLES, Y-BAR
EPS - THE RELATIVE ERROR CRITERION FOR EACH STEP, TO BE USED FOR THOSE COMPONENTS OF Y-BAR WHICH ARE GREATER THAN A IN ABSOLUTE VALUE
H - THE INTEGRATION INTERVAL, H
FIRST - WILL HAVE ONE OF THE FOLLOWING SETTINGS:
0 - WHEN KUTMER IS ENTERED FOR THE FIRST TIME, OR IS RE-ENTERED WITH A CHANGED INTERVAL <H>. WHEN KUTMER IS SO ENTERED, <FIRST> IS RESET BY KUTMER TO 1.
1 - WHEN KUTMER IS RE-ENTERED WITH THE SAME INTERVAL <H>, TO CONTINUE AN INTEGRATION SEQUENCE. UNDER THESE CIRCUMSTANCES, KUTMER WILL NOT RESET <FIRST>.
2 - WHEN KUTMER CANNOT MEET THE SPECIFIED ERROR CRITERIA EVEN WHEN THE INTEGRATION STEP HAS BEEN REDUCED TO H/128. KUTMER WILL RESET <FIRST> TO 2 AND PRINT A STATEMENT INDICATING THAT THE ERROR CRITERION COULD NOT BE MET. THEN KUTMER WILL RETURN CONTROL TO THE CALLING PROGRAM.
HCX - IS SET UP BY KUTMER BEFORE EACH RETURN TO THE CALLING PROGRAM. THIS WILL CONTAIN THE MIMINUM STEP SIZE USED DURING THE INTEGRATION OVER THE INTERVAL <H>.
A - AN ABSOLUTE ERROR CRITERION TO BE USED FOR ANY COMPONENT OF Y-BAR WHENEVER IT BECOMES SMALLER IN ABSOLUTE VALUE THAN <A>.

ON ENTRY, <T> AND THE ARRAY <Y> CONTAIN VALUES OF THE INDEPENDENT AND THE DEPENDENT VARIABLES, RESPECTIVELY, AT THE BEGINNING OF THE INTERVAL OF INTEGRATION. ON RETURN, PROVIDED THE ERROR CRITERION HAS BEEN MET, I.E., <FIRST> HAS NOT BEEN RESET TO 2, <T> AND <Y> CONTAIN VALUES OF T AND Y-BAR AT THE END VALUES OF THE INTEGRATION INTERVAL OF <H>.

A SUBROUTINE FOR EVALUATING F-BAR(T,Y-BAR) WITH A CALL OF THE FORM

CALL DAUX (T, Y, F)

MUST BE SUPPLIED. HERE <T> AND THE ARRAY <Y> REFER TO T AND Y-BAR, RESPECTIVELY, AND THE ARRAY <F> SHOULD CONTAIN, ON RETURN FROM THIS SUBROUTINE, THE VECTOR F-BAR (T, Y-BAR).

REMARKS

THIS ROUTINE WILL INTEGRATE A SYSTEM OF FIRST-ORDER DIFFERENTIAL EQUATIONS OF THE FORM

$$\frac{D\overline{Y}}{DT} = \overline{F}(T,\overline{Y})$$

GIVEN A SET OF INITIAL CONDITIONS T_0, $\overline{Y}(T_0)$, AN INTERVAL H AND A SUBROUTINE FOR EVALUATING F-BAR(T,Y-BAR) FOR SPECIFIED VALUES OF T AND Y-BAR.

THE DIMENSIONS OF THE ARRAYS FOR STORING INTERMEDIATE VALUES OF THE VECTORS F-BAR AND Y-BAR ARE PRESENTLY SET TO 10. THIS CAN BE READILY CHANGED BY CHANGING THE DIMENSION STATEMENT AT THE BEGINNING OF THE SUBROUTINE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

ABS

OTHERS

DAUX - USER-SUPPLIED SUBROUTINE TO EVALUATE F-BAR

LANGUAGE: FORTRAN IV

METHOD

THE KUTTA-MERSON METHOD OF INTEGRATING A SYSTEM OF FIRST-ORDER ORDINARY DIFFERENTIAL EQUATIONS IS USED. THIS IS A FOURTH-ORDER, SINGLE-STEP METHOD WHICH PROVIDES A CONVENIENT TECHNIQUE FOR AUTOMATIC INTERVAL ADJUSTMENT (C.F., E. FOX, "NUMERICAL SOLUTION OF ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS", ADDISON-WESLEY, READING, MASS., 1962, P. 24). THE ROUTINE IS BASICALLY A TRANSLATION INTO FORTRAN OF ALGOL ALGORITHM 218 PUBLISHED IN "COMMUNICATIONS OF THE ACM", DEC. 1963.

OUTPUT UNITS

UNIT #	LFN	USE
	OUTPUT	ERROR MESSAGE

CM REQUIRED: 335B

AUTHOR

E. CUTHILL - DTNSRDC CODE 1805

DATE WRITTEN: 10/29/64 (FORTRAN VERSION)

DATE(S) REVISED

LOCATION OF DECKS

SOURCE

TAPE LABELLED: CLIBRARYUPD3,D=HY

OBJECT

EDITLIB USER LIBRARY: NSRDC

FUNCTION 'LASTC'

PURPOSE
DETERMINE NUMBER OF CHARACTERS THRU LAST NON-BLANK (NON-ZERO (00B))

FUNCTIONAL CATEGORIES: M5

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE WORD IN 'A' WHICH CONTAING THE LAST NON-BLANK (NON-ZERO) CHARACTER IS (LASTC(A,N)+9)/10

USAGE
LASTC (A)
LASTC (A, N)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SCANNED
N - NUMBER OF WORDS IN 'A' TO BE PROCESSED
LASTC - WILL CONTAIN THE NUMBER OF CHARACTERS IN 'A' EXCLUDING TRAILING BLANKS (ZEROS)

CM REQUIRED: 64B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF SHIFT
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/06/76

DATE(S) REVISED
07/25/77 - MAKE PARAMETER 'N' OPTIONAL

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

FUNCTION 'LASTCH'

PURPOSE
DETERMINE NUMBER OF CHARACTERS THRU LAST NON-BLANK

FUNCTIONAL CATEGORIES: M5

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE WORD IN 'A' WHICH CONTAINS THE LAST NON-BLANK CHARACTER IS (LASTCH(A,N)+9)/10 (CDC) OR (LASTCH(A,N)+5)/6 (B7700).

USAGE
LASTCH (A, NCHAR)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SCANNED
NCHAR - NUMBER OF CHARACTERS IN 'A' TO BE PROCESSED
LASTCH - WILL CONTAIN THE NUMBER OF CHARACTERS IN 'A' EXCLUDING TRAILING BLANKS

CM REQUIRED: 71B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND MOD
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 02/13/79

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
CDC : UPDATE LIBRARY: NSRDCPL,ID=CSYS
B7700: PF: (CSYS) SOURCE/NSRDC/LASTCH
OBJECT
CDC : EDITLIB USER LIBRARY: NSRDC
B7700: *NSRDC/LASTCH

FUNCTION 'LASTWRD'

PURPOSE
DETERMINE SUBSCRIPT OF LAST WORD OF ARRAY WHICH
CONTAINS A NON-BLANK

FUNCTIONAL CATEGORIES: M5

USAGE
LASTWRD (A, N)

DESCRIPTION OF PARAMETERS
LASTWRD - WILL CONTAIN SUBSCRIPT OF LAST WORD OF ARRAY WHICH
CONTAINS A NON-BLANK (AND NON-00B)
A - ARRAY TO BE SCANNED
N - NUMBER OF WORDS IN 'A' TO BE PROCESSED

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
LASTC - FIND LAST NON-BLANK/NON-00B CHARACTER IN ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 22B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 03/15/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

FUNCTION 'LBYT'

PURPOSE
EXTRACT VARIABLE LENGTH BYTE

FUNCTIONAL CATEGORIES: M4

USAGE
VARIABLE = LBYT (N, LENGTH, FROM)

DESCRIPTION OF PARAMETERS
VARIABLE - LOCATION INTO WHICH THE EXTRACTED BYTE IS STORED RIGHT-JUSTIFIED
N - STARTING BIT POSITION OF THE BYTE TO BE EXTRACTED. BITS ARE NUMBERED 1-60 FROM RIGHT TO LEFT.
LENGTH - LENGTH OF THE BYTE (NUMBER OF BITS)
FROM - WORD FROM WHICH THE BYTE IS TO BE EXTRACTED

REMARKS
EXTRACTS A BYTE OF ANY LENGTH (1-60 BITS) FROM A 60-BIT WORD. THE EXTRACTED BYTE IS THEN STORED RIGHT-JUSTIFIED INTO ANOTHER 60-BIT WORD.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
NONE

EXAMPLE
STARTING AT THE TWELFTH BIT FROM THE RIGHT OF A WORD, A FOUR-BIT BYTE WILL BE EXTRACTED FROM THE VARIABLE <TAKE> AND STORED IN VARIABLE <ISTORE> IN BIT PLACES 1-4.

```
TAKE   = 1111 2222 3333 4476 5555B
ISTORE = LBYT (12, 4, TAKE)
```

RESULTS IN

```
ISTORE = 0000 0000 0000 0000 0016B
```

NOTE: BIT POSITIONS 12-15 OF <TAKE> ARE 1 1 1 0.

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 16B

AUTHOR
FROM CDC KRONOS SYSTEM

DATE WRITTEN:

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'LEFTADJ'

PURPOSE
SQUEEZE LEFT AND REMOVE BLANKS AND 00B (USER MAY SUPPLY TRAILING FILL CHARACTER)

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE LAST NON-BLANK CHARACTER POSITION AND WORD ARE RETURNED.

USAGE
```
CALL LEFTADJ (A, NA, LASTC, NW, FILL)
CALL LEFTADJ (A, NA, LASTC, NW)
```

DESCRIPTION OF PARAMETERS

A	- ARRAY TO BE LEFT JUSTIFIED
NA	- NUMBER OF WORDS IN 'A' TO BE PROCESSED
LASTC	- WILL RETURN THE LAST CHARACTER POSITION WHICH IS NON-BLANK/NON-00B (LEFT-MOST CHARACTER POSITION IS 1) (IF ARRAY CONTAINS ONLY BLANKS AND/OR 00B, LASTC IS SET TO 0)
NW	- WILL RETURN SUBSCRIPT OF WORD CONTAINING LAST NON-BLANK/NON-00B CHARACTER (IF LASTC=0, THEN NW IS SET TO 0)
FILL	- OPTIONAL FILL CHARACTER FOR EACH CHARACTER POSITION AFTER LASTC (USE 1R OR 1H FORMAT) (IF OMITTED, FILL CHARACTER IS 00B)

CM REQUIRED: 117B

EXAMPLE
```
DIMENSION A(4)
CONTENTS OF A: 12345     67890     ABCDEFGHIJ
CALL LEFTADJ (A, 4, LASTC, NW)
CONTENTS OF A: 1234567890ABCDEFGHIJ
LASTC IS 20; NW = 2
CALL LEFTADJ (A, 4, LASTC, NW, 1R/)
CONTENTS OF A: 1234567890ABCDEFGHIJ////////////////////
LASTC AND NW ARE THE SAME
```

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
   OTHERS
      GETCHA - EXTRACT ONE CHARACTER FROM AN ARRAY
      PUTCHA - INSERT ONE CHARACTER INTO AN ARRAY

ARITHMETIC STATEMENT FUNCTIONS
   R11FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/02/76

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'LINE6'

PURPOSE
   SET PRINT FILE TO 6 LINES PER INCH

FUNCTIONAL CATEGORIES: J4

USAGE
   CALL LINE6 (IOUT)

DESCRIPTION OF PARAMETER
   IOUT - OUTPUT UNIT NUMBER (1-99) OR NAME (1-7 CHARACTERS,
          LEFT-JUSTIFIED, ZERO-FILLED)

REMARKS
   USER SHOULD PRINT HIS NEXT LINE AT THE TOP OF THE NEXT PAGE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

OUTPUT UNIT

UNIT #	LFN	USE
IOUT		LISTABLE OUTPUT FILE

CM REQUIRED: 20B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 06/11/76

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'LINE8'

PURPOSE
   SET PRINT FILE TO 8 LINES PER INCH

FUNCTIONAL CATEGORIES: J4

USAGE
   CALL LINE8 (IOUT)

DESCRIPTION OF PARAMETER
   IOUT - OUTPUT UNIT NUMBER (1-99) OR NAME (1-7 CHARACTERS,
          LEFT-JUSTIFIED, ZERO-FILLED)

REMARKS
   USER SHOULD PRINT HIS NEXT LINE AT THE TOP OF THE NEXT PAGE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

OUTPUT UNIT

UNIT #	LFN	USE
IOUT		LISTABLE OUTPUT FILE

CM REQUIRED: 20B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 06/11/76

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'MACHINE'

PURPOSE
   RETURN 4-WORD SYSTEM HEADING

USAGE
   CALL MACHINE (ARRAY)

DESCRIPTION OF PARAMETER
   ARRAY - 4-ELEMENT ARRAY WHICH WILL CONTAIN THE SYSTEM

FUNCTIONAL CATEGORIES: Q0
            HEADING
            (E.G., ' NSRDC 6600 NOS/BE   1.2 I+1980330   ')

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

LANGUAGE: COMPASS

CM REQUIRED: 25B

AUTHOR
   NSRDC CODE 1892.3

DATE WRITTEN: 04/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      CODE 1892.3
   OBJECT
      EDITLIB SYSTEM LIBRARY: NSRDC

FUNCTION 'MASKIT'

PURPOSE
DYNAMIC MASK GENERATOR

FUNCTIONAL CATEGORIES: M0

USAGE
MSK = MASKIT (FL1, BIT1, FL2, BIT2, ..., FLN, BITN)

DESCRIPTION OF PARAMETERS
FL - NUMBER OF BITS
BIT - STARTING BIT ADDRESS
BIT ADDRESSES ARE THE RELEVANT POWER OF 2.
I.E., 59,58,57,... ...,2,1,0

REMARKS
MASKIT GENERATES AS ITS FUNCTIONAL VALUE A WORD WITH 'N' FIELDS OF BITS SET, EACH FIELD 'FL' BITS LONG, AND STARTING AT BIT ADDRESS 'BIT'.

EXAMPLE: TO GENERATE THE MASK
1110001111111111101110000000001000100000001111110000001111111
7 0 7 7 7 6 7 0 0 0 4 2 0 0 7 7 0 0 7 7

USE THE FOLLOWING:
MSK = MASKIT (3,59, 11,53, 3,41, 1,29, 1,25, 6,17, 6,5)

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 16B

AUTHOR
C FLINK - KPS NWL

DATE WRITTEN: 07/70

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'MATINS'

PURPOSE
MATRIX INVERSION WITH ACCOMPANYING SOLUTION OF SIMULTANEOUS EQUATIONS AND DETERMINANT

FUNCTIONAL CATEGORIES: F4 F1 F3

LANGUAGE: FORTRAN IV

COMPUTERS
CDC 6000
BURROUGHS B7700

REMARKS
TESTS FOR LOSS OF DIGITS DUE TO SUBTRACTION.

TO SCALE THE DETERMINANT, ROUTINE MUST BE RECOMPILED TO OMIT INTERNAL 'DETERM = 1.'. IN THIS CASE, PARAMETER 'DETERM' IS THE INPUT SCALING FACTOR AS WELL AS THE OUTPUT DETERMINANT.

USAGE
CALL MATINS (A, NR, N1, B, NC, M1, DETERM, ID, INDEX)

DESCRIPTION OF PARAMETERS

A	- INPUT MATRIX (NR X NR) (WILL BE REPLACED BY INVERSE OF 'A')
NR	- REFERS TO CALLING PROGRAM DIMENSIONS: # ROWS IN 'A'; # COLUMNS IN 'A'; # ROWS IN 'B'; # ROWS IN 'INDEX'
N1	- ORDER OF 'A' (ACTUAL SIZE OF 'A' BEING USED)
B	- COLUMN VECTORS (WILL BE REPLACED BY CORRESPONDING SOLUTION VECTORS)
NC	- REFERS TO CALLING PROGRAM DIMENSIONS: # COLUMNS IN 'B'
M1	- NUMBER OF ACTUAL COLUMN VECTORS IN 'B' (MAY BE 0)
DETERM	- OUTPUT DETERMINANT
ID	- OUTPUT CODE 1 - INVERSE SUCCESSFUL 2 - MATRIX 'A' SINGULAR
INDEX	- WORKING STORAGE ARRAY OF DIMENSION (NR X 3)

NOTE: N1 <= NR; M1 <= NC

CM REQUIRED: CDC 6000: 356B
B7700 : EST 286 WORDS

METHOD
PIVOT METHOD - GAUSS-JORDAN

```
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      ABS
   OTHERS
      NONE

AUTHORS
   ANF402 FROM SHARE
   SHARON E GOOD - DTNSRDC CODE 1892.1
   C R NEWMAN    - NOL

DATE WRITTEN: 11/71

DATE(S) REVISED
   07/26/77 - ADD CRN CODING (SEG)

LOCATION OF DECKS
   SOURCE
      CDC 6000:   TAPE LABELLED:   CLIBRARYUPD3
      B7700   :   *SOURCE/NSRDC/MATINS
   OBJECT
      CDC 6000:   EDITLIB USER LIBRARY:   NSRDC
      B7700   :   *NSRDC/MATINS
```

```
SUBROUTINE 'MAXE'
FUNCTION   'MAXE'
FUNCTION   'AMAXE'

PURPOSE
   FIND MAXIMUM VALUE OF AN ARRAY

FUNCTIONAL CATEGORIES:  M5

USAGE
   CALL MAXE (ARRAY, ISIZE, AMAXV)

   MAXV  =  MAXE (IARRAY, ISIZE)
   AMAXV = AMAXE ( ARRAY, ISIZE)

DESCRIPTION OF PARAMETERS
   ARRAY  - REAL ARRAY TO BE PROCESSED
   IARRAY - INTEGER ARRAY TO BE PROCESSED
   ISIZE  - LENGTH OF ARRAY/IARRAY
   AMAXV  - REAL MAXIMUM RETURNED IN SUBROUTINE

REMARKS
   FUNCTION  MAXE HAS INTEGER INPUT AND OUTPUT.
   FUNCTION AMAXE HAS REAL    INPUT AND OUTPUT.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 14B

AUTHOR
   C FLINK - KPS NWL

DATE WRITTEN: 11/22/70

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'MEMUSED'

PURPOSE
PRINT MESSAGE IN DAYFILE GIVING FIELD LENGTH IN USE AT TIME OF CALL TO THIS ROUTINE

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
THIS ROUTINE ISSUES A MEMORY MACRO REQUEST TO DETERMINE FIELD LENGTH AND PRINTS A MESSAGE IN THE DAYFILE OF THE FORM:

FIELD LENGTH IN USE (OCTAL) = XXXXXX

IT MIGHT BE OF INTEREST TO USERS WITH PROGRAMS WHICH MANAGE FIELD LENGTH DYNAMICALLY ABOVE THAT SHOWN IN THE NORMAL LOAD MAP (SUCH AS FILE BUFFER SPACE IN COBOL PROGRAMS).

USAGE
CALLED FROM COBOL PROGRAM
ENTER MEMUSED.

CALLED FROM FTN PROGRAM
CALL MEMUSED

CM REQUIRED: 30B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
BRUCE D. BLACK - DTNSRDC CODE 1892.1 (CDC)

DATE WRITTEN: 04/07/78

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

FUNCTION 'MFETCH'

PURPOSE
   FETCH A SINGLE WORD (BY ABSOLUTE ADDRESS) FROM USER'S FL

FUNCTIONAL CATEGORIES: K2

USAGE
   MFETCH (ADDR)

DESCRIPTION OF PARAMETER
   ADDR - ADDRESS IN USER'S FL TO BE FETCHED

REMARKS
   'MFETCH' IS AN ENTRY POINT IN 'CMDRCT'.

   NO ERROR CHECKING IS DONE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 11B (INCLUDES 'MSET')

AUTHOR
   ? - NWL

DATE WRITTEN:

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USSER LIBRARY: NSRDC

```
SUBROUTINE 'MFRAME'

PURPOSE
   OBTAIN THE MACHINE AND MAINFRAME RUNNING THE PROGRAM

FUNCTIONAL CATEGORIES:  Q0

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
   BURROUGHS B7700
   CDC 6000

REMARKS
   NONE

USAGE
   CALL MFRAME (CPU, MF)

DESCRIPTION OF PARAMETER
   CPU  - WILL RETURN MACHINE ON WHICH THE PROGRAM IS RUNNING
          (LEFT-ADJ, BLANK-FILLED)
          (WILL RETURN ONE OF:
             "6700", "6600", "6400", "CY74", "B7700")
   MF   - WILL RETURN MAINFRAME ON WHICH THE PROGRAM IS RUNNING
          (LEFT-ADJ, BLANK-FILLED)
          (WILL RETURN ONE OF:
             "MFA", "MFB", "MFC", "MFD", "MFZ")

CM REQUIRED: CDC   : 76B
             B7700: EST 41 WORDS

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND       OR        SHIFT
   OTHERS
      MACHINE  - GET SYSTEM MACHINE INFORMATION

ARITHMETIC STATEMENT FUNCTIONS
   A38FMT0 - FAST A-FORMAT DECODE (LEFT-ADJ, BLANK-FILLED)
             (INSERT 0 AFTER 3RD CHARACTER)

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/15/79

DATE(S) REVISED
   08/15/80 - ADD "CY74" FOR CYBER 74

LOCATION OF DECKS
   SOURCE
      CDC   : UPDATE LIBRARY:   NSRDCPL,ID=CSYS
      B7700: *SOURCE/NSRDC/MFRAME
   OBJECT
      CDC   : EDITLIB USER LIBRARY:   NSRDC
      B7700: *NSRDC/MFRAME
```

```
SUBROUTINE 'MINE'
FUNCTION   'MINE'
FUNCTION   'AMINE'

PURPOSE
   FIND MINIMUM VALUE OF AN ARRAY

FUNCTIONAL CATEGORIES:  M5

USAGE
   CALL MINE (ARRAY, ISIZE, AMINV)

   MINV  =  MINE (IARRAY, ISIZE)
   AMINV = AMINE ( ARRAY, ISIZE)

DESCRIPTION OF PARAMETERS
   ARRAY  - REAL ARRAY TO BE PROCESSED
   IARRAY - INTEGER ARRAY TO BE PROCESSED
   ISIZE  - LENGTH OF ARRAY/IARRAY
   AMINV  - REAL MINIMUM RETURNED IN SUBROUTINE

REMARKS
   FUNCTION  MINE HAS INTEGER INPUT AND OUTPUT.
   FUNCTION AMINE HAS REAL    INPUT AND OUTPUT.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 14B

AUTHOR
   C FLINK - KPS NWL

DATE WRITTEN: 11/22/70

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'MONTH'

PURPOSE
FROM A DATE (MM/DD/YY) FIND THE MONTH AND RETURN FULL SPELLING AND 3- OR 4-CHARACTER ABBREVIATION

FUNCTIONAL CATEGORIES: M2

USAGE
CALL MONTH (DATE, MONTH, MM)

DESCRIPTION OF PARAMETERS
DATE - DATE TO BE PROCESSED ('MM/DD/YY ', ' MM/DD/YY ' OR ' MM/DD/YY')
IMONTH - WILL CONTAIN THE MONTH (COMPLETE SPELLING)
MM - WILL CONTAIN THE MONTH (3- OR 4-CHARACTER ABBREVIATION)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
I21FMT - FAST I-FORMAT DECODE
L11FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 63B

AUTHOR
DAVID V SMOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 07/21/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'MOVCHAR'

PURPOSE
MOVE ONE CHARACTER FROM ONE STRING TO ANOTHER

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL MOVCHAR (FROM, FROM COL, TO, TO COL)

DESCRIPTION OF PARAMETERS
FROM - ARRAY CONTAINING STRING FROM WHICH THE CHARACTER IS TO BE EXTRACTED
FROM COL - POSITION OF CHARACTER IN FROM (1 IS LEFTMOST POSITION)
TO - ARRAY TO WHICH THE CHARACTER IS TO BE MOVED
TO COL - POSITION OF CHARACTER IN TO (1 IS LEFTMOST POSITION)

CM REQUIRED: 35B

EXAMPLE
BEFORE: FROM=THIS IS A CHARACTER STRING.
TO =THIS IS ANOTHER STRING
CALL MOVSTR (FROM, 27, TO, 23)
AFTER : TO =THIS IS ANOTHER STRING.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND MOD OR SHIFT
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/14/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'MOVECM'

PURPOSE
MOVE WORDS FROM ONE AREA IN CORE TO ANOTHER

FUNCTIONAL CATEGORIES: M4

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
'MOVECM' IS ABOUT 20 PERCENT FASTER THAN THE FTN-SUPPLIED 'MOVLEV'. IT MOVES 4 WORDS AT A TIME (INSTEAD OF 2) AND DOES NOT REQUIRE AT LEAST ONE CM WORD BETWEEN THE SENDING AND RECEIVING FIELDS.

AT SPEED, 'MOVECM' MOVES ABOUT 2 WORDS PER MICROSECOND.

USAGE
CALL MOVECM (FWA, LWA, NEW FWA)

DESCRIPTION OF PARAMETERS
FWA - FIRST WORD ADDRESS OF SENDING FIELD
LWA - LAST WORD ADDRESS OF SENDING FIELD
NEW FWA - FIRST WORD ADDRESS OF RECEIVING FIELD

(MOVE MEMORY WORDS BEGINNING AT FWA AND ENDING AT LWA TO A BLOCK STARTING AT NEW FWA.)

CM REQUIRED: 20B

EXAMPLE
MOVE ARRAY 'A' TO ARRAY 'B':

```
...
DIMENSION A(100), B(100)
...
CALL MOVECM (A(1), A(100), B(1))
...
```

METHOD
WORDS ARE MOVED 4 AT A TIME, UNLESS FEWER THAN 4 REMAIN TO BE MOVED.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
NONE

AUTHOR
EXTRACTED FROM 'NETED', THE TEXT EDITOR FROM ED FOURT OF LAWRENCE BERKLEY LABS

DATE WRITTEN:

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'MOVEIT'

PURPOSE
MOVLEV REPLACEMENT WHICH CALLS MOVECM

FUNCTIONAL CATEGORIES: K2

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

REMARKS
AT NOS/BE LEVEL 461, THE FTN SUBROUTINE 'MOVLEV' USES CMM, WHICH CAN CAUSE PROBLEMS WITH PROGRAMS MOVING INTO PROGRAM-EXTENDED FL. SUBROUTINE 'MOVECM' IS A MUCH FASTER ROUTINE WHICH DOES NOT USE CMM, HOWEVER, IT HAS A DIFFERENT CALLING SEQUENCE. 'MOVEIT' IS A TRANSITIONAL SUBROUTINE. IT HAS THE SAME CALLING SEQUENCE AS 'MOVLEV' BUT CALLS 'MOVECM'. IT TAKES A LITTLE LONGER TO EXECUTE THE MOVE BECAUSE IT INVOLVES TWO (2) CALLS, BUT THE CALLING SEQUENCE MAY BE MOVE MEANINGFUL AND EASIER TO USE.

USAGE
CALL MOVEIT (FROM, TO, NWORDS)

DESCRIPTION OF PARAMETERS
FROM - ARRAY TO BE MOVED
TO - RECEIVING ARRAY
NWORDS - NUMBER OF WORDS TO BE MOVED

CM REQUIRED: 20B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
MOVECM - MOVE AN ARRAY 4 WORDS AT A TIME

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/16/79

DATE(S) REVISED
07/15/80 - MOVE TO NSRDC

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

```
SUBROUTINE 'MOVSTR'

PURPOSE
   MOVE A STRING OF CHARACTERS FROM ONE ARRAY TO ANOTHER

FUNCTIONAL CATEGORIES:  M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   NONE

USAGE
   CALL MOVSTR (FROM, IFROM, TO, ITO, LEN, IRC)
   CALL MOVSTR (FROM, IFROM, TO, ITO, LEN)

DESCRIPTION OF PARAMETERS
   FROM  - ARRAY FROM WHICH STRING IS TO BE EXTRACTED
   IFROM - STARTING POSITION OF STRING TO BE EXTRACTED
           (POSITION 1 IS LEFT-MOST CHARACTER OF FROM(1))
   TO    - ARRAY TO RECEIVE THE STRING
   ITO   - STARTING POSITION TO INSERT THE STRING
           (POSITION 1 IS LEFT-MOST CHARACTER ON TO(1))
   LEN   - NUMBER OF CHARACTERS IN STRING TO BE MOVED
   IRC   - OPTIONAL ERROR RETURN CODE
           0 - NO ERROR, STRING MOVED
           1 - IFROM LE 0
           2 - ITO   LE 0
           3 - LEN   LE 0

CM REQUIRED: 71B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND       LOCF       MOD       OR        SHIFT
   OTHERS
      NONE

EXAMPLE
   FROM: ABCDEFGHIJKLMNOPQRSTUVWXYZ   TO: **********
   AFTER CALL MOVSTR (FROM, 5, TO, 12, 4, IRC)
   FROM: ABCDEFGHIJKLMNOPQRSTUVWXYZ   TO: **********EFGH*****
   IRC : 0

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/04/76

DATE(S) REVISED
   04/04/77 - MAKE IRC OPTIONAL

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'MSET'

PURPOSE
   SET A SINGLE WORD (BY ABSOLUTE ADDRESS) IN USER'S FL

FUNCTIONAL CATEGORIES: K2

USAGE
   CALL MSET (ADDR, NEW)

DESCRIPTION OF PARAMETERS
   ADDR - ADDRESS IN USER'S FL TO BE SET
   NEW - WORD TO BE PUT INTO 'ADDR'

REMARKS
   'MSET' IS AN ENTRY POINT IN 'CMDRCT'.

   NO ERROR CHECKING IS DONE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 11B (INCLUDES 'MFETCH')

AUTHOR
   ? - NWL:

DATE WRITTEN:

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

FUNCTION 'MXGET'

PURPOSE
EXTRACT (RIGHT-JUSTIFIED, ZERO-FILLED) 0-10 6-BIT CHARACTERS FROM 60-BIT WORDS

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

REMARKS
NONE

USAGE
MXGET (WORD, START, NCHAR)

DESCRIPTION OF PARAMETERS
WORD - WORD FROM WHICH CHARACTERS ARE TO BE EXTRACTED
START - STARTING CHARACTER
(LEFT-MOST CHARACTER IS POSITION 1)
NCHAR - NUMBER OF CHARACTERS TO EXTRACT (0-10)
MXGET - WILL CONTAIN ONE OF:
-1 -- START OR NCHAR OR START+NCHAR INVALID
0 -- IF NCHAR IS 0
XXX -- EXTRACTED CHARACTER STRING, R-FORMAT

CM REQUIRED: 26B

EXAMPLES
1) EXTRACT CHARACTERS 3-7 FROM A WORD CONTAINING 'ABCDEFGHIJ':

```
DATA WORD/ "ABCDEFGHIJ"/
...
ICHARS = MXGET (WORD, 3, 5)
```

ICHARS WILL CONTAIN 'CDEFG' (0000 0000 0003 0405 0607B)

2) EXTRACT 'THIS' FROM 'THISSTRING':

```
DATA IWORD/ "THISSTRING"/
...
IF (MXGET(IWORD,1,4) .EQ. 4RTHIS) ...
```

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND SHIFT
OTHERS
NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/17/79

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'NEWDAT'

PURPOSE
ADD/SUBTRACT SPECIFIED NUMBER OF DAYS TO/FROM A GIVEN DATE

FUNCTIONAL CATEGORIES: M2

USAGE
CALL NEWDAT (FMT, OLD, NEW, OCENT, NCENT, ADD)

DESCRIPTION OF PARAMETERS
FMT - FORMAT OF DATE (INTEGER)
1 - 'MM/DD/YY '
2 - ' MM/DD/YY '
OLD - OLD DATE (MM/DD/YY)
NEW - NEW DATE
OCENT - OLD CENTURY (E.G., INTEGER 1900)
NCENT - NEW CENTURY (E.G., INTEGER 1900)
ADD - NUMBER OF DAYS TO ADD
(NEGATIVE TO SUBTRACT)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
JGDATE - JULIAN/GREGORIAN DATE CONVERTER (MULTI-YEAR)

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 156B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 1968

DATE(S) REVISED
02/73 - CONVERT TO SCOPE 3.3

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'NFILL'

PURPOSE
FILL ELEMENTS 1 THRU N OF AN ARRAY WITH THE VALUES 1 THRU N, RESPECTIVELY

FUNCTIONAL CATEGORIES: A1

USAGE
CALL NFILL (A, N)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE FILLED
N - NUMBER OF ELEMENTS TO BE FILLED

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 CP COMPASS

CM REQUIRED: 6B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 08/09/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

FUNCTION 'NFILLT'
SUBROUTINE 'NFILLT'

PURPOSE
TEST AN ARRAY FOR THE PRESENCE OF THE INTEGERS 1 THRU N
IN ELEMENTS 1 THRU N, RESPECTIVELY

FUNCTIONAL CATEGORIES: M5

USAGE
```
ISUB = NFILLT (A, N, I)
CALL NFILLT (A, N, I)
```

DESCRIPTION OF PARAMETERS
```
A       - ARRAY TO BE SCANNED
N       - NUMBER OF ELEMENTS TO TEST
I       - =0 - A(1) THRU A(N) CONTAIN 1 THRU N
          >0 - A(I) IS FIRST ELEMENT TO FAIL TEST
NFILLT  - IF USED AS A FUNCTION, WILL RETURN THE SAME VALUE
          AS 'I'
```

REMARKS
A SUGGESTED USE OF THIS ROUTINE IS IN CONJUNCTION WITH ONE
OF THE SORTING ROUTINES TO DETERMINE IF THE ARRAY BEING
SORTED WAS ALREADY IN ORDER.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
```
PART OF LANGUAGE
   NONE
OTHERS
   NONE
```

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV EXTENDED

CM REQUIRED: 40B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 08/19/76

DATE(S) REVISED

LOCATION OF DECKS
```
SOURCE
   UPDATE LIBRARY:   NSRDCPL,ID=CSYS
OBJECT
   EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'NUMEXEC'

PURPOSE
GET NUMBER OF EXECUTE CARD PARAMETERS WHICH WERE USED IN THIS EXECUTION OF THE PROGRAM

FUNCTIONAL CATEGORIES: Q0

USAGE
CALL NUMEXEC (NEXEC)

DESCRIPTION OF PARAMETER
NEXEC - WILL RETURN THE NUMBER OF EXECUTE CARD PARAMETERS

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
MFETCH - GET SPECIFIED WORD OF USER'S FL

ARITHMETIC STATEMENT FUNCTIONS
R38FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

METHOD
THE NUMBER OF PARAMETERS IS IN THE RIGHTMOST 18 BITS OF WORD RA+52 (64B) IN THE USER'S FL.

CM REQUIRED: 16B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 04/15/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TAPE LABELLED CSYSNSRDCPL; P.F. NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'NUMVAR'

PURPOSE
GET THE NUMBER OF ARGUMENTS THAT WERE PASSED TO THE ROUTINE WHICH CALLED NUMVAR

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: CDC 6000 CP COMPASS

COMPUTERS
CDC 6000

REMARKS
WHEN USED, IT SHOULD PRECEDE OTHER EXECUTABLE STATEMENTS IN THE SUBPROGRAM TO INSURE THAT THE REGISTERS HAVE NOT BEEN DESTROYED.

USAGE
CALL NUMVAR (NARGS)

DESCRIPTION OF PARAMETER
NARGS - WILL CONTAIN THE NUMBER OF ARGS IN THE ROUTINE WHICH CALLED NUMVAR

CM REQUIRED: 5B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
NONE

AUTHOR
MIKE CHERNICK

DATE WRITTEN: UNKNOWN

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

```
FUNCTION   'OFMTDE'

PURPOSE
   FAST O-FORMAT DECODE

FUNCTIONAL CATEGORIES:  I2

USAGE
   VARIABLE = OFMTDE (IWORD, ISTART, NCHAR)

DESCRIPTION OF PARAMETERS
   VARIABLE - WILL CONTAIN THE RESULT RIGHT-JUSTIFIED
              OR -1 IF NON-OCTAL DIGIT FOUND
              OR -2 IF ISTART IS OUT OF RANGE
              OR -3 IF ISTART+NCHAR GREATER THAN 10.
              (IF VARIABLE IS INTEGER, OFMTDE MUST BE DECLARED
              INTEGER IN THE CALLING PROGRAM)
   IWORD    - WORD FROM WHICH THE FIELD WILL BE EXTRACTED
   ISTART   - FIRST CHARACTER POSITION OF FIELD WITHIN IWORD
              (1-10)
   NCHAR    - NUMBER OF CHARATERS IN FIELD (1-10)
              (ISTART+NCHAR MUST BE LESS THAN 11)

EXAMPLE
   VARIABLE = OFMTDE (10L1234567654, 6, 3)   WILL PRODUCE
   VARIABLE = 0000 0000 0000 0000 0676B

   VARIABLE = OFMTDE (5L123.4, 3, 3)         WILL PRODUCE
   VARIABLE = 7777 7777 7777 7777 7776B

   VARIABLE = OFMTDE (IWORD, 0, 5)           WILL PRODUCE
   VARIABLE = 7777 7777 7777 7777 7775B

   VARIABLE = OFMTDE (IWORD, 3, 8)           WILL PRODUCE
   VARIABLE = 7777 7777 7777 7777 7774B

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      SHIFT

LANGUAGE: FORTRAN IV

CM REQUIRED: 76B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/24/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

FUNCTION 'OFMTV'

PURPOSE
FAST O-FORMAT DECODE OF VARIABLE LENGTH INPUT

FUNCTIONAL CATEGORIES: I2

USAGE
VARIABLE = OFMTV (I)

DESCRIPTION OF PARAMETERS
VARIABLE - WILL CONTAIN THE RESULT RIGHT-JUSTIFIED
OR -1 IF A NON-OCTAL DIGIT FOUND.
IF VARIABLE IS INTEGER, OFMTV MUST BE
DECLARED INTEGER IN THE CALLING PROGRAM.
I - WORD OF OCTAL DIGITS ENDING WITH AN OCTAL
00B. (EG, 3L123, 9L123456701)

EXAMPLE
VARIABLE = OFMTV (5L12345) WILL RETURN
VARIABLE = 0000 0000 0000 0001 2345B

VARIABLE = OFMTV (1L+) WILL RETURN
VARIABLE = 7777 7777 7777 7777 7776B

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 35B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/24/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'OPLSA'

PURPOSE
ORTHOGONAL POLYNOMIAL LEAST SQUARE APPROXIMATION

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE APPROXIMATING POLYNOMIAL IS
C(1)+C(2)*X+C(3)*X**2+...+C(M+1)*X**M

FOR MORE THAN 9TH DEGREE OR MORE THAN 30 DATA POINTS, THE SOURCE PROGRAM MUST BE REDIMENSIONED.

USAGE
CALL OPLSA (N, W, X, F, M, D, A, C)

DESCRIPTION OF PARAMETERS
N - NUMBER OF DATA POINTS (MAX: 30)
W - ARRAY OF N WEIGHTS
X - ARRAY OF N DATA POINTS
F - ARRAY OF N FUNCTION VALUES
M - DESIRED DEGREE OF POLYNOMIAL (MAX: 9)
D - OUTPUT ARRAY OF COEFFICIENTS OF POLYNOMIALS O(J,X) (DIMENSION: 10,N)
A - OUTPUT ARRAY OF COEFFICIENTS OF O(J,X)'S OF LEAST SQUARE POLYNOMIALS (DIMENSION: M+1)
C - ARRAY TO CONTAIN COEFFICIENTS OF RESULTING LEAST SQUARE POLYNOMIAL (SEE REMARKS) (DIMENSION: M+1)

CM REQUIRED: 755B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHORS
UNIVERSITY OF MARYLAND
S VOIGT

DATE WRITTEN: 1971

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK AMOPLSA)
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'OVLNAME'

PURPOSE
   GET NAME OF FILE CURRENTLY BEING EXECUTED

FUNCTIONAL CATEGORIES: Q0

USAGE
   CALL OVLNAME (I)

DESCRIPTION OF PARAMETER
   I - WILL CONTAIN THE LOCAL FILE NAME CURRENTLY BEING
       EXECUTED

REMARKS
   'I' MAY BE USED AS THE FIRST ARGUMENT IN 'CALL OVERLAY'

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

LANGUAGE: CDC 6000 COMPASS

METHOD
   THE FILE NAME IS EXTRCACTED FROM BITS 59-18 OF WORD
   RA+64B IN THE USER'S FIELD LENGTH

CM REQUIRED: 3

AUTHOR
   ? - NWL

DATE WRITTEN: ?

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      TAPE LABELLED CSYSNSRDCPL: P.F. NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'PARGET'

PURPOSE
GET ALL PARAMETERS OF USER-SUPPLIED PARAMETER STRING

FUNCTIONAL CATEGORIES: M4

USAGE
```
CALL PARGET (IAREA, LAREA, IPARAM, NPARAM, ISEP, RSEP, LSEP)
CALL PARGET (IAREA, LAREA, IPARAM, NPARAM, ISEP, RSEP)
CALL PARGET (IAREA, LAREA, IPARAM, NPARAM, ISEP)
CALL PARGET (IAREA, LAREA, IPARAM, NPARAM)
```

DESCRIPTION OF PARAMETERS

IAREA - AREA CONTAINING PARAMETER LIST TO BE EXTRACTED

LAREA - NUMBER OF WORDS IN 'IAREA' (16 MAX)

IPARAM - ARRAY TO CONTAIN PARAMETERS
(IF IT IS NOT KNOWN WHETHER THE PARAMETER LIST IN IAREA CONTAINS A TERMINATOR ('.' OR ')') OR NOT, THEN IPARAM, ISEP, LSEP AND RSEP SHOULD BE DIMENSIONED AT LEAST 10 TIMES LAREA. THIS WILL ALLOW FOR THE WORST POSSIBLE CASE (IAREA ALL BLANKS).)

NPARAM - WILL BE NUMBER OF PARAMETERS FOUND

ISEP - IF PRESENT, ARRAY TO CONTAIN A CODE IDENTIFYING THE SEPARATOR FOUND FOLLOWING THE CORRESPONDING PARAMETER

DEC	OCT	SEPARATOR
1	1	.
2	2	=
3	3	/
4	4	(
5	5	+
6	6	-
7	7	BLANK
8	10B	,
14	16B	OTHER
15	17B	. OR) (TERMINATOR)

RSEP - IF PRESENT, ARRAY TO CONTAIN THE SEPARATOR FOUND (1R FORMAT)

LSEP - IF PRESENT, ARRAY TO CONTAIN THE SEPARATOR FOUND (1L FORMAT)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
OTHERS
EXTPRM - EXTRACT THE NEXT PARAMETER

ARITHMETIC STATEMENT FUNCTIONS
NONE

CM REQUIRED: 1066

AUTHOR
DAVID V SOMMER - CODE 1892.2

DATE WRITTEN: 04/11/74

DATE(S) REVISED
11/18/75 - NAME CHANGED FROM GETPAR TO PARGET TO AVOID CONFLICT WITH SYSIO ROUTINE OF SAME NAME
06/24/76 - PROCESSING OF OPTIONAL PARAMETERS MODIFIED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'PFRC'

PURPOSE
   SUPPLY DESCRIPTION OF PERMANENT FILE FUNCTION RETURN CODE

FUNCTIONAL CATEGORIES: QO

LANGUAGE : FORTRAN IV EXTENDED

REMARKS
   THE DESCRIPTIONS ARE THOSE FOUND IN THE "NOS/BE VERSION 1
   REFERENCE MANUAL" (60493800 H) ON PAGE 83.

USAGE
   CALL PFRC (IRC, A)

DESCRIPTION OF PARAMETERS
   IRC - RETURN CODE FROM THE PERMANENT FILE FUNCTION
   A   - 5-WORD ARRAY WHICH WILL CONTAIN THE DESCRIPTION OF THE
         SUPPLIED 'IRC'
         IF 'IRC' IS INVALID, 'UNKNOWN RETURN CODE' IS
         RETURNED

CM REQUIRED: 1075B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MOVEIT
   OTHERS
      NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 05/18/76

DATE(S) REVISED
   02 14 77 - UPDATE FOR NOS/BE 1.0
   07 15 80 - UPDATE FOR NOS/BE 1.4 (LEVEL 508)

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'PLOTPR'

PURPOSE
PRODUCE PRINTER PLOTS WHICH MAY HAVE:
1) ANY NUMBER OF PLOTS PER RUN
2) ANY NUMBER OF VALUES FOR THE INDEPENDENT VARIABLE
3) UP TO 9 DEPENDENT VARIABLES PER PLOT.

FUNCTIONAL CATEGORIES: J5

LANGUAGE: FORTRAN IV

USAGE

```
   COMMON /PLO/ NRUN, NPLOT, ITP(6), ITY(6), ITX(6),
                NUMPAG, MAXSCA, SCA(10), FROM(10)
     ...
   CALL INITPLO
C  SET ANY SPECIAL VALUES IN COMMON /PLO/ AFTER 'CALL INITPLO'
     ...
C  WRITE DATA FOR THE PLOT
   DO 5 I=1,NOPTS
5  WRITE (NFILE) VARIND(I), VARDEP1(I), ...., VARDEPN(I)
     ...
   CALL PLOTPR (NFILE, NUMVAR, IVAR)
```

DESCRIPTION OF PARAMETERS

NFILE - FORTRAN LOGICAL UNIT NUMBER OF FILE CONTAINING THE DATA VALUES, INDEPENDENT FOLLOWED BY DEPENDENT

NUMVAR - NUMBER OF VARIABLES (UP TO 10) (TOTAL: INDEPENDENT + DEPENDENT)

IVAR - 10-WORD ARRAY WITH ALPHANUMERIC NAMES FOR THE VARIABLES WHICH WILL APPEAR ON THE PLOT

ADDITIONAL INFORMATION IS PROVIDED THRU LABELLED COMMON BLOCK /PLO/

NRUN - NUMBER OF THIS RUN (DEFAULT: 1)

NPLOT - NUMBER OF PLOT (DEFAULT: 1)

ITP - PAGE TITLE (DEFAULT: BLANK)

ITY - Y TITLE (DEFAULT: BLANK)

ITX - X TITLE (DEFAULT: BLANK)

(TITLE ARRAYS ARE 6 WORDS EACH OF UP TO 6 CHARACTERS PER WORD - 6A6 FORMAT)

NUMPAG - NUMBER OF DOUBLE PAGES TO SPREAD THE PLOT OVER (NO MORE THAN 100 POINTS PER PAGE) (DEFAULT: 1)

MAXSCA - SCALING OPTION

1 - OPTIMUM SCALING IS CALCULATED FOR EACH VARIABLE (DEFAULT)

2 - PLOT ALL DEPENDENT VARIABLES ON THE SAME SCALE

(IF THE PROGRAMMER SCALES ANY OF THE DEPENDENT VARIABLES, THIS OPTION IS DEFAULTED)

SCA AND FROM -
ARRAYS CONTAINING THE INCREMENTS AND THE STARTING VALUES FOR EACH VARIABLE.
IF ONE OF THESE ARRAYS IS USED FOR A VARIABLE, BOTH MUST BE USED.
IF THERE ARE MORE THAN 101 VALUES FOR THE INDEPENDENT VARIABLE, THOSE VALUES MUST HAVE A CONSTANT INCREMENT AND THE SCALING IS ALWAYS BASED ON THAT INCREMENT.
(DEFAULT: OPTIMUM SCALE AND STARTING VALUE ARE CALCULATED FOR EACH VARIABLE)

REMEMBER TO PUT 'TAPENFILE' INTO PROGRAM STATEMENT OF THE MAIN PROGRAM.

CM REQUIRED: 1202B

REMARKS
A CALL TO 'INITPLO' WILL SET THE DEFAULT VALUES.

THE MINIMUM SIZE OF A GRID IS 101 X 101 POINTS (THIS IS 1-1/2 COMPUTER PAGES). IF MORE THAN 101 VALUES FOR THE INDEPENDENT VARIABLE ARE GIVEN, THE REQUIRED INTEGRAL NUMBER OF 100-POINT GRIDS ARE AUTOMATICALLY JOINED TOGETHER.

THE NAME AND VALUES OF THE INDEPENDENT VARIABLE (AND X TITLE) ARE GIVEN IN THE LEFT MARGIN. THE NAMES, SCALES AND PLOTTING CHARACTERS (A-I) FOR THE DEPENDENT VARIABLES ARE GIVEN AT THE TOP OF THE PAGE WITH THE PAGE TITLE AND Y TITLE ABOVE THEM.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE

ABS	ALOG10	AMAX1	AMIN1	AND
COMPL	EOF	OR	REWIND	SHIFT

OTHERS

DRAWGD	(221B CM)
INITGD	(47B CM)
INITPLO	(21B CM)

AUTHOR
ADAPTED FROM MIMIC BY ANN BANDURSKI - NSRDC CODE 1833

DATE WRITTEN: 05/22/72

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3
(*DECK AMPLOTP)
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'POLYN'

PURPOSE
LEAST SQUARES POLYNOMIAL FIT

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV

REMARKS
FIT AN N-TH DEGREE POLYNOMIAL TO SETS OF POINTS (X(I), Y(I), Z(I), ...), WHERE X IS THE INDEPENDENT VARIABLE IN EACH CASE, (I=1,2,...,N).
PN(X) = A(0) + A(1)*X + A(2)*X**2 + ... + A(N)*X**N

USAGE
CALL POLYN (ND, NP, NC, X, Y, NAPT, WORKA, V, SUM)

DESCRIPTION OF PARAMETERS

ND	- DEGREE OF POLYNOMIAL (N)
NP	- NUMBER OF POINTS IN SET OF OBSERVATIONS (X(I), Y(I), Z(I), ...)
NC	- NUMBER OF CURVES TO BE FITTED (E.G., Y, Z, ...)
X	- ARRAY CONTAINING THE INDEPENDENT VARIABLE
Y	- ARRAY CONTAINING THE DEPENDENT VARIABLE(S) MUST BE DIMENSIONED AT LEAST NP TIMES NC. Y(1), Y(2), ... MUST BE CONTIGUOUS IN MEMORY. Z(1) NEED NOT FOLLOW Y(N) IMMEDIATELY.
NAPT	- NUMBER OF LOCATIONS BETWEEN SETS OF DATA Y, Z, ... (NUMBER OF WORDS BETWEEN Y(1) AND Z(1).) ALL SETS Y, Z, ... MUST BE EQUALLY SPACED.
WORKA	- WORK ARRAY USED IN MATRIX SOLUTION OF THE (ND+1) SETS OF LINEAR EQUATIONS. MUST BE DIMENSIONED AT LEAST (ND+1)**2.
V	- OUTPUT ARRAY USED IN MATRIX SOLUTION FOR VECTOR. MUST BE DIMENSIONED AT LEAST (ND+1) TIMES NC. V(1), ..., V(ND+1) WILL CONTAIN COEFFICIENTS A(0), ..., A(N) OF THE FIRST CURVE.
SUM	- WORK ARRAY FOR SUMS OF POWERS OF X. MUST BE DIMENSIONED AT LEAST (2*ND+1).

CM REQUIRED: 233B (+ 170B FOR ENXEN)

METHOD
LEAST SQUARES - MINIMIZING SUM OF SQUARES OF DEVIATIONS FROM AVERAGE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   PART OF PROGRAM
      ENXEN
   OTHERS
      NONE

AUTHOR
   J. N. BROOKS   (SHARE ROUTINE NUMBER 848)

DATE WRITTEN: 01/29/60

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY ON TAPE LABELLED CLIBRARYUPD:
                                          (*DECK ARPLN1)
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'PROOT'

PURPOSE
FIND ALL ROOTS OF A REAL POLYNOMIAL

FUNCTIONAL CATEGORIES: C2 B4

LANGUAGE: FORTRAN IV

REMARKS
THE POLYNOMIAL HAS THE FORM:

$$A_1 + A_2 X + \ldots + A_{N+1} X^{**N} = 0$$

USAGE
CALL PROOT (N, A, U, V, H, B, C, CONV, NPLUS2)

DESCRIPTION OF PARAMETERS

N	- DEGREE OF THE POLYNOMIAL TO BE SOLVED
A	- ARRAY (DIMENSIONED N+2) CONTAINING THE COEFFICIENTS IN THE ORDER INDICATED ABOVE
U	- ARRAY (DIMENSIONED N+2) WHICH WILL CONTAIN THE REAL PARTS OF THE ROOTS
V	- ARRAY (DIMENSIONED N+2) WHICH WILL CONTAIN THE IMAGINARY PARTS OF THE ROOTS
H,B,C	- WORK ARRAYS (EACH DIMENSIONED N+2)
CONV	- CONVERGENCE CRITERION. INITIALLY SET BY PROOT TO 1.0E-35 (FAR BELOW THE ACTUAL STARTING CONVERGENCE CRITERION OF 5.0E-20 (CDC 6600). IF THE POLYNOMIAL HAS NOT CONVERGED AFTER A PRESCRIBED NUMBER OF TRIES, THE CONVERGENCE CRITERION IS RELAXED. IF, UPON EXIT FROM PROOT, CONV IS NOT 1.0E-35, THE CONVERGENCE CRITERION HAS BEEN RELAXED TO THE NUMBER GIVEN.
NPLUS2	- MUST BE SET TO N+2

CM REQUIRED: 463B

METHOD
THE ROUTINE CONVERGES SIMULTANEOUSLY TOWARD A LINEAR FACTOR AND A QUADRATIC FACTOR BY NEWTON'S AND BAIRSTOW'S METHODS, RESPECTIVELY. WHEN A ROOT IS FOUND BY ONE METHOD, ITERATION CONTINUES WITH BOTH METHODS USING THEIR MOST RECENT GUESSES.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS SIGN SQRT
OTHERS
NONE

AUTHORS
MIRIAM SHAPIRO
HARVEY ABRAMSON - NEW YORK UNIVERSITY

DATE WRITTEN: UNKNOWN - ADAPTED FROM LOS ALAMOS ROUTINE
LA-PROOT BY T. L. VORDAN (MS)

DATE(S) REVISED
11/65 - CONVERTED TO CDC 6600 (HA)

LOCATION OF DECKS
SOURCE
TAPE LABELLED: CLIBRARYUPD3
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'PRTFL'

PURPOSE
   PRINT CURRENT FL (OR PUT INTO DAYFILE)

FUNCTIONAL CATEGORIES: Q0 J2

USAGE
   CALL PRTFL (IOUT)

DESCRIPTION OF PARAMETER
   IOUT - FORTRAN LOGICAL UNIT NUMBER
          (0=PUT INTO DAYFILE; N=WRITE ON TAPEN)

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      REMARK
   OTHERS
      FTNRFL - GET CURRENT FL

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 50B

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 04/16/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'PRTIME'

PURPOSE
GET AND PRINT CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES
SINCE LAST CALL AND PRINT USER-SUPPLIED MESSAGE

FUNCTIONAL CATEGORIES: Q4 J4 N0

USAGE
CALL PRTIME (IOUNIT, TIMES, MSG)
CALL PRTIME (IOUNIT, TIMES, 0)

DESCRIPTION OF PARAMETERS
IOUNIT - OUTPUT UNIT FOR PRINTED LINE
(EITHER FORTRAN LOGICAL UNIT NUMBER (1-99) OR
1- TO 7-CHARACTER LOCAL FILE NAME, LEFT-ADJ,
ZERO-FILLED (E.G., 6LOUTPUT))
TIMES - 7-WORD ARRAY TO CONTAIN THE FOLLOWING:
1 - ELAPSED CPA TIME IN SECONDS
2 - ELAPSED CPB TIME IN SECONDS
3 - ELAPSED CP TIME IN SECONDS (CPA+CPB)
4 - ELAPSED PP TIME IN SECONDS
5 - ELAPSED IO TIME IN SECONDS
6 - ELAPSED WALL CLOCK TIME (HH.MM.SS.)
7 - ELAPSED WALL CLOCK TIME IN SECONDS
MSG - 5-WORD MESSAGE TO BE PRINTED
(IF SUPPLIED AS HOLLERITH CONSTANT, MAY BE FEWER
THAN 5 WORDS. SEE EXAMPLE BELOW)
(IF MSG(1) IS 0 (OR 1L0 OR 1H0), HEADINGS, BUT NOT
TIMES, WILL BE PRINTED.)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
ELTIME - GET ELAPSED TIME SINCE LAST CALL
FINDCHR - FIND FIRST OCCURRENCE OF CHARACTER IN ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

OUTPUT UNITS

UNIT #	LFN	USE
USER SPECIFIES...		LISTABLE OUTPUT

CM REQUIRED: 102B

```
EXAMPLE
        PROGRAM TEST (OUTPUT=128, .......
        REAL TIMES(7)
C   GET INITIAL TIMES AND PRINT HEADING
        CALL PRTIME (6LOUTPUT, TIMES, 0)
          .....
C   GET ELAPSED TIMES AND PRINT WITH MESSAGE
        CALL PRTIME (6LOUTPUT, TIMES, "TEST NUMBER 1")
        ...
C   NEW HEADINGS ARE NOT NEEDED, SO CALL ELTIME DIRECTLY
        CALL ELTIME (TIMES)
          .....
C   GET ELAPSED TIMES AND PRINT WITH MESSAGE
        CALL PRTIME (6LOUTPUT, TIMES, "TEST NUMBER 2")
        ...
        END

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/20/76

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:    NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:    NSRDC
```

SUBROUTINE 'PUTCHA'
FUNCTION 'PUTCHA'

PURPOSE
INSERT CHARACTER INTO SPECIFIED POSITION IN AN ARRAY

FUNCTIONAL CATEGORIES: M4

USAGE
CALL PUTCHA (A, N, CH)
VARIABLE = PUTCHA (A, N, CH)

DESCRIPTION OF PARAMETERS
A - ARRAY INTO WHICH CHARACTER IS TO BE INSERTED
N - POSITION AT WHICH CHARACTER IS TO BE INSERTED
(POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN A(1))
CH - CHARACTER TO BE INSERTED (IN 1R FORMAT)
(WHEN USED AS A FUNCTION, PUTCHA WILL CONTAIN THE WORD
IN 'A' WHICH WAS CHANGED)

REMARKS
'PUTCHA' IS AN ENTRY POINT IN 'GETCHA'.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 52B (UNLESS GETCHA IS ALSO CALLED)

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/16/76

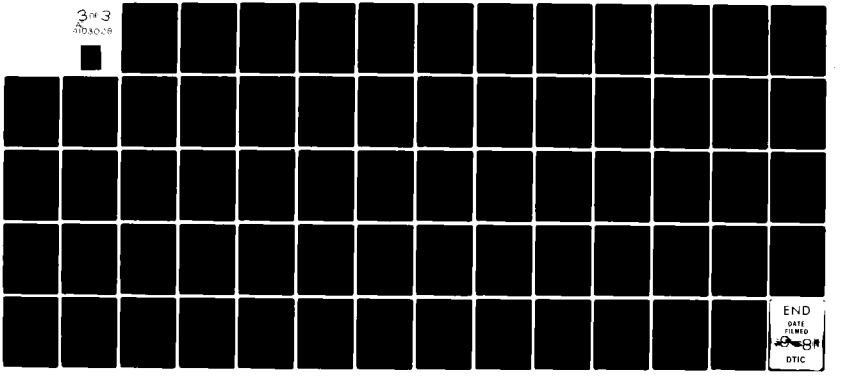
DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

AD-A103 028 DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CE--ETC F/G 9/2
COMPUTER CENTER CDC LIBRARIES/NSRDC (SUBPROGRAMS).(U)
FEB 81 D V SOMMER

UNCLASSIFIED DTNSRDC/CMLD-81-07 NL

3 OF 3
AD 103028



END
DATE FILMED
8-81
DTIC

SUBROUTINE 'PUTCHR'
FUNCTION 'PUTCHR'

PURPOSE
INSERT CHARACTER INTO SPECIFIED POSITION IN A WORD

FUNCTIONAL CATEGORIES: M4

USAGE
CALL PUTCHR (A, N, CH)
VARIABLE = PUTCHR (A, N, CH)

DESCRIPTION OF PARAMETERS
A - WORD INTO WHICH CHARACTER IS TO BE INSERTED
N - POSITION AT WHICH CHARACTER IS TO BE INSERTED
(POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN A)
CH - CHARACTER TO BE INSERTED (IN 1H FORMAT)
(WHEN USED AS A FUNCTION, PUTCHR WILL CONTAIN THE SAME AS 'A')

REMARKS
'PUTCHR' IS AN ENTRY POINT IN 'GETCHR'.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 43B (UNLESS GETCHR IS ALSO CALLED)

AUTHOR
FROM BIMED PACKAGE

DATE WRITTEN:

DATE(S) REVISED
1975 - DAVID V SOMMER - DTNSRDC CODE 1892.2

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'QSORT'

PURPOSE
IN-CORE ASCENDING SORT FOR REAL ARRAYS LARGER THAN 500 WORDS

FUNCTIONAL CATEGORIES: M1

LANGUAGE: FORTRAN IV

USAGE
CALL QSORT (A, I)

DESCRIPTION OF PARAMETERS
A - REAL ARRAY TO BE SORTED INTO ASCENDING ORDER
I - NUMBER OF WORDS IN 'A' TO BE SORTED

REMARKS
'QSORT' IS THE MOST EFFICIENT SORT AVAILABLE (AS OF DATE BELOW) FOR THE SORTING IN CORE OF ARRAYS LARGER THAN 500 WORDS.

THIS ROUTINE IS A TRANSLATION OF ALGORITHM 402, COMM. ACM, NOV, 1970.

IF THE JOB ABORTS WITH THE MESSAGE "ABORT IN QSORT WITH MN=<MN>', CHECK IF MN EXCEEDS KL (CURRENTLY KL=46). IF SO, THE VALUE OF KL AND THE DIMENSION OF ARRAY K MUST BE SET HIGHER (TRY DOUBLING IT).
ON THE B7700:
THE SUBROUTINE MUST BE CHANGED AND RECOMPILED.
ON THE CDC:
WRITE A DUMMY SUBROUTINE TO SET KL AND THE DIMENSION OF K GREATER.

THIS SUBROUTINE MIGHT HAVE THE FORM:

```
      SUBROUTINE DUMMY
      COMMON /QSORT/ KL, K(<NEW>)
      KL = <NEW>
      RETURN
      END
```

A CALL TO THIS SUBROUTINE MUST OCCUR BEFORE ANY CALL TO QSORT; THE BEST PLACE BEING ONE OF THE FIRST STATEMENTS IN THE MAIN PROGRAM.

CM REQUIRED: B7700: 312 + 65B COMMON
CDC : 232B + 57B COMMON

ERROR MESSAGE
ABORT IN QSORT WITH MN=<MN>
SEE REMARKS.

OUTPUT UNIT (B7700)

UNIT #	INTNAME	USE
	FILE6	ERROR MESSAGE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      DISPLA (CDC)
   OTHERS
      ZABORT - NON-EXISTENT ROUTINE TO FOREC ABORT

AUTHORS
   C FLINK - KPS NWL
   DTNSRDC CODE 1892

DATE WRITTEN: 11/25/70 - CF

DATE(S) REVISED
   01/30/81 - DVS - ADD DAYFILE ERROR MESSAGE
                  - CHANGE ABORT PROCESS
   02/17/81 - DVS - CONVERT TO B7700

LOCATION OF DECKS
   SOURCE
      B7700:   *SOURCE/NSRDC/QSORT1
      CDC :   UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      B7700:   *NSRDC/QSORT1
      CDC :   EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'QSORT1'

PURPOSE
IN-CORE ASCENDING SORT WITH RE-ORDERING OF ASSOCIATED ARRAY
(FOR REAL ARRAYS LARGER THAN 500 WORDS)

FUNCTIONAL CATEGORIES: M1

LANGUAGE: FORTRAN IV

USAGE
CALL QSORT1 (A, I, T)

DESCRIPTION OF PARAMETERS
A - REAL ARRAY TO BE SORTED INTO ASCENDING ORDER
I - NUMBER OF WORDS IN 'A' TO BE SORTED
T - ASSOCIATED ARRAY TO BE REORDERED

REMARKS
'QSORT1' IS THE MOST EFFICIENT SORT AVAILABLE (AS OF DATE BELOW) FOR THE SORTING IN CORE OF ARRAYS LARGER THAN 500 WORDS.

THIS ROUTINE IS A TRANSLATION OF ALGORITHM 402, COMM. ACM NOV. 1970.

IF THE ARRAY 'T' IS NOT NEEDED, USE 'QSORT'.

IF THE JOB ABORTS WITH THE MESSAGE "ABORT IN QSORT1 WITH MN=<MN>", CHECK IF MN EXCEEDS KL (CURRENTLY KL=46).
IF SO, THE VALUE OF KL AND THE DIMENSION OF ARRAY K MUST BE SET HIGHER (TRY DOUBLING IT).
ON THE B7700:
THE SUBROUTINE MUST BE CHANGED AND RECOMPILED.
ON THE CDC:
WRITE A DUMMY SUBROUTINE TO SET KL AND THE DIMENSION OF K GREATER.

THIS SUBROUTINE MIGHT HAVE THE FORM:

```
      SUBROUTINE DUMMY
      COMMON /QSORT/ KL, K(<NEW>)
      KL = <NEW>
      RETURN
      END
```

A CALL TO THIS SUBROUTINE MUST OCCUR BEFORE ANY CALL TO QSORT1: THE BEST PLACE BEING ONE OF THE FIRST STATEMENTS IN THE MAIN PROGRAM.

CM REQUIRED: B7700: 362 + 65B COMMON
CDC : 220B + 57B COMMON

```
OUTPUT UNIT (B7700)
   UNIT #   INTNAME                        USE
   -------  -------   ----------------------------------------
            FILE6     ERROR MESSAGE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      DISPLA (CDC)
   OTHERS
      ZABORT  - NON-EXISTENT ROUTINE TO FOREC ABORT

AUTHORS
   C FLINK - KPS NWL
   DTNSRDC CODE 1892

DATE WRITTEN: 11/30/70

DATE(S) REVISED
   01/30/81 - DVS - ADD DAYFILE ERROR MESSAGE
                  - CHANGE ABORT PROCESS
   02/17/81 - DVS - CONVERT TO B7700

LOCATION OF DECKS
   SOURCE
      B7700:   *SOURCE/NSRDC/QSORT1
      CDC  :   UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      B7700:   *NSRDC/QSORT1
      CDC  :   EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'QUADG'

PURPOSE
   INTEGRAL BY GAUSS-LEGENDRE 10-POINT QUADRATURE

FUNCTIONAL CATEGORIES: D1

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   APPROXIMATES

$$\int_{XL}^{XU} F(X)\,DX = \frac{XU-XL}{2} * \sum WI * F\left(\frac{ZI(XU-XL)+XU+XL}{2}\right)$$

   WHERE WI ARE WEIGHT FACTORS
         ZI ARE ROOTS OF LEGENDRE POLYNOMIAL
         INTEGRAL IS FROM XL TO XU.

USAGE
   CALL QUADG (XL, XU, FNC, Y)

DESCRIPTION OF PARAMETERS
   XL - LOWER LIMIT OF INTEGRATION
   XU - UPPER LIMIT OF INTEGRATION
   FNC - THE EXTERNAL FUNCTION FOR EVALUATING THE INTEGRAND
         F(X))
         (USER MUST SUPPLY THE FUNCTION 'FNC' WITH ONE ARGUMENT
         FOR EVALUATING F(X), THE INTEGRAND. FNC MUST BE
         DECLARED EXTERNAL IN THE ROUTINE CALLING QUADG.
   Y   - THE RESULTING INTEGRAL VALUE

CM REQUIRED: 171B

METHOD
   LET A = .5*(XU+XL)
        B = XU - XL,
   THEN, SINCE THE ZI'S ARE SYMMETRIC ABOUT ZERO,
       Y = B*SUM-FROM-0-TO-4((WI/2)*(FNC(A+(ZI/2)*B) +
                                     FNC(A-(ZI/2)*B))

REFERENCE
   "APPLIED NUMERICAL METHODS" BY B. CARNAHAN, H. LUTHER
   AND J. WILKES, WILEY, 1969, P. 103.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

AUTHOR
   SUSAN VOIGT - DTNSRDC CODE 1892

DATE WRITTEN: 09/71

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
                                        (*DECK AMQUADG)
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'RCPA'

PURPOSE
   READ (A PORTION OF) CONTROL POINT AREA

FUNCTIONAL CATEGORIES: K2

USAGE
   CALL RCPA (ISTART, NWORDS, AREA)

DESCRIPTION OF PARAMETERS
   ISTART - STARTING WORD IN CONTROL POINT AREA
   NWORDS - NUMBER OF WORDS TO READ
   AREA   - ARRAY TO HOLD THE SPECIFIED WORDS
            (AREA(2) THRU AREA(NWORDS+1))

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 43B

AUTHOR
   MIKE GOLDEN   - DTNSRDC CODE 1844
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/75

DATE(S) REVISED
   12/03/75

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'RECOVRD'

PURPOSE
ON RECOVERY, PRINT EXCHANGE JUMP PACKAGE, RA+0 THRU RA+77B
AND ENDRUN INDICATOR

FUNCTIONAL CATEGORIES: N2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE

```
...
EXTERNAL RECOVRD
...
CALL RECOVR (RECOVRD, 77B, 0)
  ...

  --OR--

...
EXTERNAL ANY
...
CALL RECOVR (ANY, 77B, 0)
...
SUBROUTINE ANY (EXCHJP, ENDRUN, RA0)
DIMENSION EXCHJP(17)
CALL RECOVRD (EXCHJP, ENDRUN, RA0)
  ...
```

DESCRIPTION OF PARAMETERS
EXCHJP - 17-WORD ARRAY TO HOLD EXCHANGE JUMP PACKAGE
ENDRUN - ENDRUN INDICATOR (WILL HAVE MEANING ONLY IF SECOND FORM OF USAGE IS USED AND IF ENDRUN IS SET BEFORE THE CALL TO RECOVRD)
RA0 - RA+0 POINTER (NOT USED BY THIS SUBROUTINE)

CM REQUIRED: 601B

OUTPUT UNITS

LFN	USE
OUTPUT	LISTABLE OUTPUT

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
GETRA - GET RA+0 THRU RA+77B

AUTHOR

DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 06/19/74

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'REDUCE'

PURPOSE
   REDUCE FL TO MINIMUM OR REQUEST ADDITIONAL FL RELATIVE TO
   START OF BLANK COMMON

FUNCTIONAL CATEGORIES: Q0

USAGE
   CALL REDUCE - REDUCE TO FIRST WORD OF BLANK COMMON
   CALL REDUCE (I) - ADJUST TO 'I' WORDS AFTER START OF BLANK
                     COMMON

DESCRIPTION OF PARAMETER
   I - IF PRESENT, NUMBER OF WORDS PAST START OF BLANK COMMON

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
      SHIFT
   OTHERS
      MFETCH - GET SPECIFIED WORD IN USER'S FL
      MSET - SET SPECIFIED WORD IN USER'S FL

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 36B (PLUS 1 IN BLANK COMMON)

AUTHOR
   ? - NWL

DATE WRITTEN: ?

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      TAPE LABELLED CSYSNSRDCPL: P.F. NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'REPLAC'

PURPOSE
   REPLACE ONE CHARACTER BY ANOTHER IN AN ARRAY

FUNCTIONAL CATEGORIES: M4

USAGE
   CALL REPLAC (A, NA, OLD, NEW)

DESCRIPTION OF PARAMETERS
   A   - ARRAY TO BE PROCESSED
   NA - NUMBER OF WORDS IN 'A' TO BE PROCESSED
   OLD - OLD CHARACTER (1R FORMAT)
   NEW - NEW CHARACTER (1R FORMAT)

REMARKS
   ALL PARAMETERS ARE TYPE 'INTEGER'

SUBROUTINE AND FUNCTIONS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   L91FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
   R110FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 57B

AUTHOR
   DAVID A. SOMMER - DTNSTDC CODE 1892.2

DATE WRITTEN: 1973

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'REPLACM'

PURPOSE
   REPLACE OLD CHARACTERS WITH NEW CHARACTERS

FUNCTIONAL CATEGORIES: M4

USAGE
   CALL REPLACM (A, NA, OLD, NEW, NCH)

DESCRIPTION OF PARAMETERS
   A   - ARRAY TO BE PROCESSED
   NA - NUMBER OF WORDS IN 'A' TO BE PROCESSED
   OLD - ARRAY OF OLD CHARACTERS (1R FORMAT)
   NEW - ARRAY OF CORRESPONDING NEW CHARACTERS (1R FORMAT)
   NCH - NUMBER OF CHANGE PAIRS (DIMENSION OF 'OLD' AND 'NEW')

REMARKS
   ALL ARGUMENTS ARE TYPE 'INTEGER'.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   L91FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
   R110FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 73B

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 05/21/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'REPLHI'

PURPOSE
   REPLACE ALL CHARACTERS GREATER THAN SPECIFIED CHARACTER WITH
   NEW CHARACTER

FUNCTIONAL CATEGORIES: M4

USAGE
   CALL REPLHI (A, NA, OLD, NEW)

DESCRIPTION OF PARAMETERS
   A   - ARRAY TO BE PROCESSED
   NA - NUMBER OF WORDS IN 'A' TO BE PROCESSED
   OLD - OLD CHARACTER (1R FORMAT)
   NEW - NEW CHARACTER (1R FORMAT)

REMARKS
   ALL PARAMETERS ARE TYPE 'INTEGER'

SUBROUTINE AND FUNCTIONS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   L91FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
   R11OFMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 60B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/26/76

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'REPLLO'

PURPOSE
REPLACE ALL CHARACTERS LESS THAN SPECIFIED CHARACTER WITH NEW CHARACTER

FUNCTIONAL CATEGORIES: M4

USAGE
CALL REPLLO (A, NA, OLD, NEW)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE PROCESSED
NA - NUMBER OF WORDS IN 'A' TO BE PROCESSED
OLD - OLD CHARACTER (1R FORMAT)
NEW - NEW CHARACTER (1R FORMAT)

REMARKS
ALL PARAMETERS ARE TYPE 'INTEGER'

SUBROUTINE AND FUNCTIONS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
L91FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
R110FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 60B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/26/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'REPLNE'

PURPOSE
   REPLACE ALL CHARACTERS (EXCEPT SPECIFIED CHARACTER) WITH A
   SPECIFIED CHARACTER

FUNCTIONAL CATEGORIES: M4

USAGE
   CALL REPLNE (A, NA, OLD, NEW)

DESCRIPTION OF PARAMETERS
   A   - ARRAY TO BE PROCESSED
   NA - NUMBER OF WORDS IN 'A' TO BE PROCESSED
   OLD - OLD CHARACTER (1R FORMAT)
   NEW - NEW CHARACTER (1R FORMAT)

REMARKS
   ALL PARAMETERS ARE TYPE 'INTEGER'

SUBROUTINE AND FUNCTIONS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   L91FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
   R110FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 57B

AUTHOR
   DAVID V SOMMER - DTNSTDC CODE 1892.2

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

```
SUBROUTINE 'REQUEST'

PURPOSE
   CALLABLE REQUEST FUNCTION

FUNCTIONAL CATEGORIES:  Q3

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   ASSIGNMENT OF EQUIPMENT MAY BE REQUESTED FROM A RUNNING
   CENTRAL PROCESSOR PROGRAM BY THE REQUEST SUBROUTINE, WHICH
   HAS THE EFFECT OF A REQUEST CARD.

   FOR FURTHER INFORMATION, CALL
      MIKE CHERNICK
      (202) 227-1683  OR  IDS 150-1683  OR AUTOVON 287-1683

USAGE
   CALL REQUEST (IRC, LFN, ICODE, SN)
   CALL REQUEST (IRC, LFN, ICODE)
   CALL REQUEST (IRC, LFN)

DESCRIPTION OF PARAMETERS
   IRC      - OUTPUT: RIGHT-JUSTIFIED SYSTEM-GENERATED ERROR
              RETURN CODE
              IRC=0    - REQUEST WAS SUCCESSFUL
   LFN      - CONTENTS DETERMINED BY ICODE
              IF ICODE IS NON-ZERO, LFN IS A 1-7 CHARACTER LOCAL
                FILE NAME, LEFT-JUSTIFIED, ZERO- OR BLANK-FILLED
                (E.G., 5LTAPE7).
              IF ICODE IS ZERO (OR MISSING), LFN IS AN ARRAY
                CONSTRUCTED AS DESCRIBED IN NOS/BE REFERENCE
                MANUAL, PAGE 7-42 ON.
   ICODE    - DETERMINES CONTENTS OF LFN AND EFFECT OF REQUEST
              ICODE 0 OR MISSING    - LFN IS AN ARRAY CONTAINING
                PARAMETERS FOR REQUEST MACRO
              ICODE = "*Q", 2H*Q OR 2L*Q - LFN IS 1-7 CHARACTER
                LOCAL FILE NAME AND REQUEST HAS EFFECT OF
                REQUEST,LFN,*Q.
              ICODE ANYTHING ELSE - LFN IS 1-7 CHARACTER LOCAL
                FILE NAME AND REQUEST HAS THE EFFECT OF
                REQUEST,LFN,*PF.
   SN       - OPTIONAL SN (*PF ONLY)
              WHEN USED, IS 1-7 CHARACTER USER DEVICE SET NAME
              (HAS EFFECT OF  REQUEST,LFN,*PF,SN=SETNAME.)

CM REQUIRED: 125B

EXAMPLES
   REQUEST,TAPE1,*PF.                  BECOMES
   CALL REQUEST (IRC, 5LTAPE1, 1)

   REQUEST,TAPE2,*Q.                   BECOMES
   CALL REQUEST (IRC, 5LTAPE2, "*Q")

   REQUEST,TAPE3,*PF,SN=MYSET1.        BECOMES
   CALL REQUEST (IRC, "TAPE3", "*PF", "MYSET1")
```

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF   SHIFT
   OTHERS
      IZONK   NUMVAR   ZPFMAC

AUTHORS
   JAMES BLACK, MIKE CHERNICK - DTNSRDC CODE 1832
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 05/26/71

DATE(S) REVISED
   01/10/75 - V3.5 - MC
   01/27/77 - DVS - ADD *Q
   03/24/77 - DVS - ADD SN

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'RFFT'

PURPOSE
FAST FOURIER TRANSFORM OF A REAL TABULATED FUNCTION

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL RFFT (A, M, INV, S, IFERR)

DESCRIPTION OF PARAMETERS

A	- THE ARRAY CONTAINING A REAL TABULATED ONE-DIMENSIONAL FUNCTION. 'A' MUST BE DIMENSIONED AS A POWER OF 2 AND REQUIRES 4 ADDITIONAL LOCATIONS BEYOND THE LENGTH OF THE DATA. TOTAL DIMENSION FOR 'A' IS 2**(M+1)+4. ON OUTPUT 'A' CONTAINS THE FOURIER TRANSFORM. A(1) AND A(2) CONTAIN, RESPECTIVELY, THE REAL AND IMAGINARY ZERO-CYCLE COMPONENTS; A(3) AND A(4) CONTAIN THE FUNDAMENTAL FREQUENCY COMPONENTS, ETC.
M	- ONE LESS THAN THE SMALLEST INTEGER BASE 2 LOGARITHM THAT HAS AN ANTILOG WHICH WILL CONTAIN ALL THE ELEMENTS TO BE TRANSFORMED. FOR EXAMPLE, IF THE ARRAY TO BE TRANSORMED CONTAINS 28 POINTS, M MUST BE SET TO 4.
INV	- SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'
S	- SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'
IFERR	- ERROR RETURN CODE = 0 -- NORMAL COMPLETION <>0 -- ERRORS IN SUBROUTINE ARGUMENTS

NOTE: $3 \leq M \leq 20$. THIS IS BASED ON AN ARRAY WHICH HAS A LENGTH THAT CAN BE EXPRESSED AS A POWER OF 2. IF THE DATA OCCUPIES LESS SPACE THAN 2**(M+1), THE REMAINING LOCATIONS MUST BE SET TO ZERO OR ANOTHER APPROPRIATE CONSTANT.

CM REQUIRED: 320B

METHOD

THIS OPERATION MAKES USE OF THE SEPARABLE PROPERITES OF THE FOURIER COEFFICIENTS OF THE REAL AND IMAGINARY COMPONENTS OF THE COMPLEX VECTOR. THIS IS ALMOST A SPEIAL CASE OF THE DUAL USE OF THE COOLEY-TUKEY ALGORITHM DESCRIBED IN REFERENCE 2. REFERENCES TO THIS METHOD CAN BE FOUND IN REFERENCE 3 ALSO.

IN BRIEF, A SCALED VERSION OF THE FIRST PORTION OF THE REAL ARRAY IS PLACED IN THE REAL COMPONENT OF THE VECTOR, WHILE A SCALED VERSION OF THE SECOND PORTION OF THE ARRAY IS PLACED IN THE COMPLEX COMPONENT. THE ALGORITHM IS PERFORMED IN NORMAL FASHION ON THE COMPLEX ARRAY. THE COEFFICIENTS FOR THE REAL ARRAY ARE OBTAINED BY PROPERLY COMBINING AND REORDERING THE FOURIER COEFFICIENTS FROM THE COMPLEX PROCESSING.

REFERENCES

1. COOLEY, J. W. AND TUKEY, J. W. "AN ALGORITHM FOR THE MACHINE CALCULATION OF COMPLEX FOURIER SERIES," MATH. COMPUT. 19, 90 (APRIL 1965), 297-301.
2. GODFREY, M. D., BINGHAM, C., AND TUKEY, J. W., "MODERN TECHNIQUES OF POWER SPECTRUM ESTIMATION," IEEE TRANS. ON AUDIO AND ELECTROACOUSTICS (JUNE 1967), PP. 56-66.
3. SINGLETON, RICHARD C., "ON COMPUTING THE FAST FOURIER TRANSFORM," COMM. OF THE ACM, VOL 10, NO 10, OCTOBER 1967.
4. SYSTEM/360 SCIENTIFIC SUBROUTINE PACKAGE, IBM TECHNICAL PUBLICATIONS DEPT., 1967.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

COS FLOAT SIN

OTHERS

FFT - FAST FOURIER TRANSFORM OF A COMPLEX TAB FCN

AUTHORS

WES RICE
DUANE HARDER
LOS ALAMOS SCIENTIFIC LABORATORY

VIM ROUTINE LASL C330A

DATE WRITTEN: 07/24/68

DATE(S) REVISED

02/69 - DH

LOCATION OF DECKS

SOURCE

UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK LASC330)

OBJECT

EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'RFSN'

PURPOSE
INVERSE FAST FOURIER TRANSFORM

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL RFSN (A, M, INV, S, IFERR)

DESCRIPTION OF PARAMETERS

A	- THE ARRAY CONTAINING THE REAL AND IMAGINARY FOURIER COEFFICIENT. A(1) AND A(2) CONTAIN, RESPECTIVELY, THE REAL AND IMAGINARY COMPONENTS, ETC. 2**(M+1)+1 AND 2**(M+1)+2 ARE THE FINAL FREQUENCY SUBSCRIPTS WHICH ARE USED IN THE SYNTHESIS. 'A' MUST BE DIMENSIONED AT LEAST 2**(M+1)+4. ON OUTPUT 'A' CONTAINS THE INVERSE FOURIER TRANSFORM.
M	- ONE LESS THAN THE SMALLEST INTEGER BASE 2 LOGARITHM THAT HAS AN ANTILOG WHICH WILL CONTAIN ALL THE ELEMENTS TO BE TRANSFORMED. FOR EXAMPLE, IF THE ARRAY TO BE TRANSFORMED CONTAINS 28 POINTS, M IS SET TO 4. THIS RESULT WOULD REQUIRE 17 PAIRS OF COEFFICIENTS.
INV	- SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'
S	- SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'
IFERR	- ERROR RETURN CODE = 0 -- NORMAL COMPLETION <>0 -- ERRORS IN SUBROUTINE ARGUMENTS

NOTE: $3 \leq M \leq 20$. ALL COEFFICIENTS MUST BE DEFINED; THEREFORE ALL 2**(M+1) REAL AND IMAGINARY COEFFICIENTS MUST BE SET TO APPROPRIATE VALUES.

CM REQUIRED: 307B

METHOD

THIS OPERATION MAKES USE OF THE SEPARABLE PROPERITES OF THE FOURIER COEFFICIENTS OF THE REAL AND IMAGINARY COMPONENTS OF A COMPLEX VECTOR. THE ALGORITHM IS ACCOMPLISHED BY PERFORMING IN REVERSE ORDER THE INVERSE OF EACH STEP IN SUBROUTINE RFFT. THIS IS ALMOST A SPECIAL CASE OF THE DUAL USE OF THE COOLEY-TUKEY ALGORITHM DESCRIBED IN REFERENCE 2. ANOTHER SIMILAR TECHNIQUE IS DESCRIBED IN REFERENCE 3.

REFERENCES

1. COOLEY, J. W. AND TUKEY, J. W. "AN ALGORITHM FOR THE MACHINE CALCULATION OF COMPLEX FOURIER SERIES," MATH. COMPUT. VOL 19, NO 90 (APRIL 1965), 297-301.
2. GODFREY, M. D., BINGHAM, C., AND TUKEY, J. W., "MODERN TECHNIQUES OF POWER SPECTRUM ESTIMATION," IEEE TRANS. ON AUDIO AND ELECTROACOUSTICS (JUNE 1967), PP. 56-66.
3. SINGLETON, RICHARD C., "ON COMPUTING THE FAST FOURIER TRANSFORM," COMM. OF THE ACM, VOL 10, NO 10, OCTOBER 1967.
4. SYSTEM/360 SCIENTIFIC SUBROUTINE PACKAGE, IBM TECHNICAL PUBLICATIONS DEPT., 1967.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

COS SIN

OTHERS

FFT - FAST FOURIER TRANSFORM OF A COMPLEX TAB FCN

AUTHORS

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LOS ALAMOS SCIENTIFIC LABORATORY

VIM ROUTINE LASL C331A

DATE WRITTEN: 08/07/68

DATE(S) REVISED

02/69 - DH

LOCATION OF DECKS

SOURCE

UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK LASC331)

OBJECT

EDITLIB USER LIBRARY: NSRDC

FUNCTION 'RNDMIZ'

PURPOSE
EMULATE BASIC LANGUAGE 'RANDOMIZE' STATEMENT (CAN BE USED TO GUARANTEE FIRST CALL TO RANF WILL RESULT IN A DIFFERENT NUMBER WITH EACH EXECUTION OF A PROGRAM)

FUNCTIONAL CATEGORIES: V1

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
R = RNDMIZ (N)

DESCRIPTION OF PARAMETERS
N - DUMMY ARGUMENT - IGNORED
RNDMIZ - WILL RETURN A RANDOM NUMBER SIMILAR TO THAT OBTAINED BY RANF

CM REQUIRED: 23B

METHOD
THE RANF SEED IS CHANGED USING THE CURRENT CP TIME (FRACTIONAL PART ONLY)

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
INT RANF SECOND
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/08/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ROUTE'

PURPOSE
CALLABLE ROUTE COMMAND

FUNCTIONAL CATEGORIES: Q3

LANGUAGE: FORTRAN IV EXTENDED AND CDC 6000 COMPASS

REMARKS
THE FILE TO BE ROUTED MUST BE ON A QUEUE DEVICE.

THE CALLING PROGRAM MUST CLOSE THE FILE BEFORE 'ROUTE' IS CALLED. AN FTN SEQUENTIAL FILE (WRITE, PRINT, PUNCH) MAY BE "CLOSED" BY ISSUING A 'REWIND N' BEFORE THE CALL TO 'ROUTE'. IF THE FILE IS NOT CLOSED, THE FINAL BUFFER MAY NOT BE ROUTED.

USAGE
```
CALL ROUTE (IRC, IPRMS, NW)
CALL ROUTE (IRC, IPRMS)
```

DESCRIPTION OF PARAMETERS
IRC - ERROR RETURN CODE
NOS/BE-GENERATED

DEC	OCT	MEANING
1	001	INVALID LFN - DSP
2	002	CANNOT ROUTE NON-ALLOCATABLE EQUIPMENT
3	003	CANNOT ROUTE PERMANENT FILE
4	004	NO PERMISSION TO ROUTE THIS FILE
5	005	ROUTE TO INPUT NOT IMMEDIATE - IGNORED
6	006	IMMEDIATE ROUTING - NO FILE - IGNORED
7	007	INVALID DISPOSITION CODE - ROUTING IGNORED
8	010	INVALID FID - ROUTING IGNORED
9	011	DSP ABORTED BY SYSTEM
10	012	DSP PARAMETER OUTSIDE FL
11	013	PRIORITY SPECIFICATION IGNORED
12	014	E1200 SPECIFIED - INTERCOM USED (DSP)
13	015	E1200 SPECIFIED - INTERCOM USED (DSP)
14	016	CANNOT ROUTE INPUT FILE
15	017	DSP COMPLETE BIT ALREADY SET
16	020	FILE ON DISMOUNTABLE DEVICE - ROUTING IGNORED
17	021	TID NOT ALPHANUMERIC - ROUTING IGNORED
18	022	FORMS CODE NOT ALPHANUMERIC - ROUTING IGNORED
19	023	INVALID LINK TYPE - ROUTING IGNORED (DSP)
20	024	FILE NOT ON QUEUE DEVICE - ROUTING IGNORED
21	025	PRE-DAYFILE LFN AND NO DC=IN - ROUTE IGNORED
22	026	PRE-DAYFILE FILE NOT FOUND - ROUTE IGNORED

IPRMS - PARAMETERS FOR ROUTE
(UNUSED FIELDS MUST BE SET TO ZERO)

IPRMS	CONTENTS	FORMAT
1	LFN	1-7 CHAR, LEFT**
2	DC	0 FOR DEFAULT -OR- 2-CHAR DISPOSITION CODE, LEFT**
3	TID	0 -OR- 1LC - ROUTE TO CENTRAL SITE -OR- 3-CHAR TERMINAL ID, LEFT** -OR- 4LHERE - ROUTE TO THIS TERMINAL
4	FID	1-7 CHAR FILE ID -OR- 1L* -OR- 1-5 CHAR FILE ID, PRECEDED BY * (ALL LEFT**)
5	DEF	0 -OR- 3LDEF - TO DEFER ROUTING UNTIL END-OF-JOB
6		NON-ZERO TO RETURN THE JOB NAME IN THIS WORD
7	FC	0 -OR- 2-CHAR FORMS CODE, LEFT**
8	EC	0 - USE DEFAULT FOR PRINT: 2LB4, 2LB6, 2LA6, 2LA9 FOR PUNCH: 2LSB, 5L80COL, 3L026, 3L029, 5LASCII
9	IC	ONE OF: 0 OR 3LDIS - DISPLAY CODE 5LASCII - ASCII 3LBIN - BINARY
10	STID	3-CHAR STATION (SITE) ID, LEFT**
11	PRI	PRIORITY FOR INTERACTIVELY ROUTED OUTPUT FILE BEING ROUTED TO THE ROUTING TERMINAL - 1-4 DIGIT OCTAL VALUE (0000B-7777B) FOR ALL OTHER FILES - 0
12	REP	REPEAT COUNT (0-31 (37B))
13	NCD	0 -OR- 1 - NO COMPLEMENTARY DAYFILE (VALID ONLY IF IPRMS(5)=3LDEF)

** LEFT=LEFT-JUSTIFIED, BLANK OR ZERO PADDED

NW - NUMBER OF LAST ELEMENT IN IPRMS (OPTIONAL)
(IF OMITTED, NW=13)

CM REQUIRED: 347B

EXAMPLES

1) ASSUME THE PROGRAM HAS WRITTEN FILE 'TAPE7' TO BE PRINTED AT CENTRAL SITE:

```
      ...
      INTEGER IPRMS(13)
      ...
      IPRMS(1) = 5LTAPE7
      IPRMS(2) = 2LPR
      IPRMS(3) = 1LC
      IPRMS(4) = 1L*
      ...
      REWIND 7
      CALL ROUTE (IRC, IPRMS, 4)
         ...
```

THIS WILL SIMULATE: ROUTE,TAPE7,DC=PR,TID=C,FID=*.

2) A PROGRAM WISHES TO PUNCH FILE 'PUNCH' AT REMOTE TERMINAL '011' AT END OF JOB:

```
      ...
      INTEGER IPRMS(13)
      ...
      IPRMS(1) = 5LPUNCH
      IPRMS(2) = 2LPU
      IPRMS(3) = 3L011
      IPRMS(4) = 1L*
      IPRMS(5) = 3LDEF
      IPRMS(6) = 1
      ...
      CALL ROUTE (IRC, IPRMS, 6)
      IF (IRC .EQ. 0) PRINT 1, IPRMS(6)
    1 FORMAT (" TAPE7 WILL BE PRINTED WITH JOB NAME " A7)
         ...
```

THIS WILL SIMULATE: ROUTE,PUNCH,DC=PU,TID=011,FID=*,DEF.

3) A PROGRAM CREATES A 'JOB' ON FILE 'TAPE99' TO BE SUBMITTED TO THE SAME INPUT QUEUE AS THE CREATING JOB:

```
      ...
      INTEGER IPRMS(13)
      ...
      IPRMS(1) = 6LTAPE99
      IPRMS(2) = 2LIN
      IPRMS(3) = 4LHERE
      ...
      WRITE (99, 1)
   99 FORMAT ("JOBCARD" / "CHARGE CARD" / "....")
      REWIND 99
      CALL ROUTE (IRC, IPRMS, 3)
```

THIS WILL SIMULATE: ROUTE,TAPE99,DC=IN,TID.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND LOCF MAX0 MIN0 MOVLEV
      OR SHIFT
   OTHERS
      BZFILL - CHANGE BLANKS TO 00B
      HERE - GET TERMINAL IS FOR THIS JOB
      HEX3 - CONVERT 3-DIGIT HEX TO 2-CHAR
      TRAILBZ - CHANGE TRAILING BLANKS TO 00B
      ZSYSEQ - CALL THE SYSTEM

ARITHMETIC STATEMENT FUNCTIONS
   FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
      L11FMT L21FMT L31FMT L52FMT L71FMT
   FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)
      R18FMT R21FMT

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/08/75

DATE(S) REVISED
   01/24/77 - ADD REP PARAMETER, CHANGE PRI DESCRIPTION
   11/30/77 - ADD NCD PARAMETER
   10/01/78 - CHANGE TO 3-CHARACTER TID

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ROUTERC'

PURPOSE
   SUPPLY DESCRIPTION OF ROUTE RETURN CODE

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   THE DESCRIPTIONS ARE THOSE FOUND IN THE "NOS/BE VERSION 1
   REFERENCE MANUAL" (60493800 H) ON PAGE 7-82.

USAGE
   CALL ROUTERC (IRC, A)

DESCRIPTION OF PARAMETERS
   IRC - RETURN CODE FROM SUBROUTINE 'ROUTE'
   A   - 5-WORD ARRAY WHICH WILL CONTAIN THE DESCRIPTION OF THE
         SUPPLIED 'IRC'
         (IF 'IRC' IS INVALID, 'UNKNOWN RETURN CODE' IS
         RETURNED)

CM REQUIRED: 625B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      MOVEIT - MOVE AN ARRAY

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/15/77

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'SBYT'
FUNCTION 'SBYT'

PURPOSE
STORE VARIABLE LENGTH BYTE

FUNCTIONAL CATEGORIES: M4

USAGE
CALL SBYT (N, LENGTH, INTO, FROM)
-OR-
VARIABLE = SBYT (N, LENGTH, INTO, FROM)

DESCRIPTION OF PARAMETERS
N - BEGINNING BIT POSITION IN WORD <INTO> WHERE THE BYTE WILL BE PLACED. BITS ARE NUMBERED FROM 1 TO 60 FROM RIGHT TO LEFT.
LENGTH - LENGTH OF THE BYTE IN BITS. THIS LENGTH STARTS WITH THE RIGHTMOST BIT OF <FROM>.
INTO - WORD INTO WHICH THE BYTE WILL BE PLACED.
FROM - WORD FROM WHICH THE BYTE WILL BE TAKEN FROM THE LOW ORDER BITS.

NOTE: IN THE SECOND FORM, <VARIABLE> AND <INTO> WILL CONTAIN THE SAME VALUE. THUS, THEY MAY HAVE THE SAME VARIABLE NAME.

NOTE: BITS 1 THRU <LENGTH> OF WORD <FROM> ARE PLACED INTO BITS <N> THRU (N+LENGTH-1) OF <INTO>.

REMARKS
STORES A 1 TO 60-BIT BYTE FROM ONE WORD INTO ANY POSITION IN A SECOND WORD WITHOUT DISTURBING THE REMAINING PART OF THAT WORD.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
NONE

EXAMPLE
```
I  = 7777 1111 2222 5555 4444B
J  = 3333 2222 1111 5555 4436B
AA = SBYT (37, 6, I, J)
```

RESULTS IN
```
AA = 7777 1136 2222 5555 4444B
I  = 7777 1136 2222 5555 4444B
```

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 20B

AUTHOR: FROM CDC KRONOS SYSTEM

DATE WRITTEN:

LOCATION OF DECKS
SOURCE: UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT: EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'SEMICO'

PURPOSE
   REPLACE DISPLAY CODE 00B WITH 77B (SEMI-COLON)

FUNCTIONAL CATEGORIES: M4

USAGE
   CALL SEMICO (IA, I)

DESCRIPTION OF PARAMETERS
   IA - (ARRAY) TO BE PROCESSED
   I - NUMBER OF WORDS IN 'IA' TO BE PROCESSED

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 37B

AUTHOR
   ? - NWL

DATE WRITTEN: ?

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

```
SUBROUTINE 'SETREW'

PURPOSE
   CONVERT REWIND OPTION INTO RM OPEN AND CLOSE CODES

FUNCTIONAL CATEGORIES:  M4

USAGE
   CALL SETREW (REW, OPEN, CLOSE, NOE)
   CALL SETREW (REW, OPEN, CLOSE)

DESCRIPTION OF PARAMETERS
   REW    - INPUT REWIND OPTION.  ONE OF:
            A      - OPEN=NOREWIND; CLOSE=REWIND
            B      - OPEN=REWIND  ; CLOSE=NOREWIND
            E      - OPEN=POSITION BEFORE END-OF-INFORMATION;
                     CLOSE=NOREWIND
            EN     - OPEN=POSITION BEFORE EOI; CLOSE=NOREWIND
            ER     - OPEN=POSITION BEFORE EOI; CLOSE=REWIND
            EU     - OPEN=POSITION BEFORE EOI; CLOSE=UNLOAD
            R      - OPEN=REWIND  ; CLOSE=REWIND
            U      - OPEN=REWIND  ; CLOSE=REWIND AND UNLOAD
            OTHER  - OPEN=NOREWIND; CLOSE=NOREWIND
            (ANY WORDS BEGINNING WITH THESE LETTERS WILL
            PRODUCE THE SAME RESULTS.  ONLY THE FIRST 1
            OR 2 LETTERS ARE RETURNED IN L-FORMAT)
   OPEN   - WILL CONTAIN OPEN REWIND OPTION (1LE, 1LN, 1LR)
   CLOSE  - WILL CONTAIN CLOSE REWIND OPTION (1LN, 1LR, 1LU)
   NOE    - OMITTED OR 0 - ALLOW ALL VALUES OF REW
            OTHER        - DO NOT ALLOW 'E' VALUES OF REW

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
   OTHERS
      NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 113B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/29/75

DATE(S) REVISED
   01/29/76
   01/11/76 - ADD 'NOE' PARAMETER

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'SHIFTA'

PURPOSE
   SHIFT WHOLE ARRAY SPECIFIED NUMBER OF BITS (CROSSING OVER
   WORD BOUNDARIES)

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   SEE 'ASHIFT' FOR SHIFTING INDIVIDUAL WORDS OF AN ARRAY.

USAGE
   CALL SHIFTA (A, B, N, NBITS)

DESCRIPTION OF PARAMETERS
   A   - INPUT ARRAY OF DIMENSION 'N'
   B   - OUTPUT ARRAY OF DIMENSION 'N+1'
            (MAY NOT BE SAME AS 'A')
   N   - NUMBER OF WORDS TO BE PROCESSED
   NBITS - NUMBER OF BITS TO SHIFT
             <0 - SHIFT TO LEFT
                  (LEFTMOST BITS LOST, TRAILING BITS SET TO 0,
                  B(N+1) NOT DEFINED)
             =0 - JUST MOVE (B(N+1) IS SET TO 0)
             >0 - SHIFT TO RIGHT
                  (LEADING AND TRAILING BITS SET TO 0)

CM REQUIRED: 116B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/26/74

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

FUNCTION 'SIMPUN'

PURPOSE
SIMPSON'S RULE INTEGRATION - EQUAL OR UNEQUAL INTERVALS

FUNCTIONAL CATEGORIES: D1

LANGUAGE: FORTRAN IV

REMARKS
NONE

USAGE
VALUE = SIMPUN (X, Y, N)

DESCRIPTION OF PARAMETERS
X - ARRAY OF MONOTONE X-VALUES
Y - ARRAY OR CORRESPONDING Y-VALUES
N - NUMBER OF VALUES

CM REQUIRED: 102B

ERROR MESSAGE
L=XXXXX, X=X.XXXXXXX E±YY, X NOT MONOTONE STOP
SELF-EXPLANATORY

METHOD
THE INTEGRAL FROM X1 TO XN OF YDX IS EVALUATED BY FITTING PARABOLAS TO SUCCESSIVE INTERVALS AND INTEGRATING OVER THE INTERVALS.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHORS
WERNER FRANK
SHARON E GOOD - DTNSRDC CODE 1892.1

DATE WRITTEN:

DATE(S) REVISED
06/29/58 - SEG

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3
(*DECK AMSIUF)
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'SKWEZL'

PURPOSE
   SQUEEZE LEFT AND REMOVE BLANKS AND OOB

FUNCTIONAL CATEGORIES: M4

USAGE
   CALL SKWEZL (A, NA, NC, NW)

DESCRIPTION OF PARAMETERS
   A   - ARRAY TO BE SQUEEZED
           (WILL BE REPLACED BY SQUEEZED ARRAY)
   NA   - NUMBER OF WORDS TO BE SQUEEZED
   NC   - OUTPUT NUMBER OF CHARACTERS IN SQUEEZED ARRAY
   NW   - OUTPUT NUMBER OF WORDS IN SQUEEZED ARRAY

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      GETCHA - EXTRACT CHARACTER FROM ARRAY
      PUTCHA - PUT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 111B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/19/76

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'SKWEZR'

PURPOSE
SQUEEZE RIGHT AND REMOVE BLANKS AND OOB

FUNCTIONAL CATEGORIES: M4

USAGE
CALL SKWEZR (A, NA, NC, NW)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SQUEEZED
(WILL BE REPLACED BY SQUEEZED ARRAY)
NA - NUMBER OF WORDS TO BE SQUEEZED
NC - OUTPUT POSITION OF FIRST NON-ZERO CHARACTERS IN SQUEEZED ARRAY (POSITION 1 IS LEFTMOST CHARACTER IN A(1))
NW - OUTPUT SUBSCRIPT OF FIRST NON-ZERO WORD

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
GETCHA - EXTRACT CHARACTER FROM ARRAY
PUTCHA - PUT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 115B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/19/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'SNCNDN'

PURPOSE
EVALUATE THE THREE JACOBIAN ELLIPTIC FUNCTIONS

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
IF CM=0 AND ABS(X) > (2K/PI)*6.87E10, WHERE K IS THE QUARTER PERIOD OF SN, THE ERROR MESSAGE
SNCNDN ARGUMENT X TOO LARGE. X=
IS PRINTED ON FILE 'OUTPUT'.

USAGE
CALL SNCNDN (X, CM, SN, CN, DN)

DESCRIPTION OF PARAMETERS
X - INPUT PARAMETER
CM - INPUT PARAMETER
SN - OUTPUT PARAMETER - WILL CONTAIN THE VALUE OF SN(X,K)
CN - OUTPUT PARAMETER - WILL CONTAIN THE VALUE OF CN(X,K)
DN - OUTPUT PARAMETER - WILL CONTAIN THE VALUE OF DN(X,K)

CM REQUIRED: 310B

OUTPUT UNITS

UNIT #	LFN	USE
	OUTPUT	ERROR MESSAGE (SEE REMARKS)

METHOD
GAUSS TRANSFORMATION

REFERENCE
BULIRSCH, R, "NUMERICAL CALCULATIONS OF ELLIPTIC INTEGRALS AND ELLIPTIC FUNCTIONS", NUMERISCHE MATHEMATIK, 7, 1965, PP. 78-90

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS EXP SIGN SIN SQRT
OTHERS
NONE

AUTHOR
R BULIRSCH

DATE WRITTEN: 01/68

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
CODE 1892.1
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'SSORT'

PURPOSE
   FTN-CALLABLE SHELL SORT FOR REAL ARRAYS

FUNCTIONAL CATEGORIES: M1

USAGE
   CALL SSORT (A, I, T)
   CALL SSORT (A, I)

DESCRIPTION OF PARAMETERS
   A - REAL ARRAY TO BE SORTED
   I - NUMBER OF ELEMENTS TO BE SORTED
   T - IF PRESENT, AN ASSOCIATED ARRAY RE-ORDERED TO MAINTAIN
       1 TO 1 CORRESPONDENCE WITH THE ELEMENTS OF ARRAY 'A'

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 1166

AUTHOR
   C FLINK - KPS NWL

DATE WRITTEN: 12/07/70

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'SSORTF'

PURPOSE
FTN-CALLABLE SHELL SORT FOR TWO-DIMENSIONAL REAL ARRAYS

FUNCTIONAL CATEGORIES: M1

LANGUAGE: FORTRAN IV

REMARKS
THIS ROUTINE IS INEFFICIENT IF M .GT. 10.

USAGE
```
CALL SSORTF (A, TEMP, M, N, I)
CALL SSORTF (A, TEMP, M, N)
```

DESCRIPTION OF PARAMETERS
```
A    - REAL ARRAY TO BE SORTED
TEMP - TEMPORARY ARRAY OF DIMENSION M USED IN THE SORT
M    - NUMBER OF WORDS PER ITEM
N    - NUMBER OF ITEMS PER ARRAY
       (DIMENSION OF A IS A(M,N))
I    - IF PRESENT, NUMBER FROM 1 TO M SPECIFYING ON WHICH
       WORD OF AN ITEM TO SORT.
       IF OMITTED, I=1.
```

CM REQUIRED: 117B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
```
PART OF LANGUAGE
   LOCF      SHIFT
OTHERS
   MOVECM  - MOVE AN ARRAY
```

AUTHOR
C FLINK - KPS NWL

DATE WRITTEN: 01/10/71

DATE(S) REVISED
```
11/23/76 - DVS - DTNSRDC - CHANGE SUBROUTINE SENT TO MOVLEV
02/21/80 - DVS - DTNSRDC - CHANGE MOVLEV TO MOVECM
```

LOCATION OF DECKS
```
SOURCE
   UPDATE LIBRARY:   NSRDCPL,ID=CSYS
OBJECT
   EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'SSORTI'

PURPOSE
FTN-CALLABLE SHELL SORT FOR TWO-DIMENSIONAL INTEGER ARRAYS

FUNCTIONAL CATEGORIES: M1

USAGE
CALL SSORTI (A, TEMP, M, N, I)
CALL SSORTI (A, TEMP, M, N)

DESCRIPTION OF PARAMETERS
A - INTEGER ARRAY TO BE SORTED
TEMP - TEMPORARY ARRAY OF DIMENSION M USED IN THE SORT
M - NUMBER OF WORDS PER ITEM
N - NUMBER OF ITEMS PER ARRAY
(DIMENSION OF A IS A(M,N))
I - IF PRESENT, NUMBER FROM 1 TO M SPECIFYING ON WHICH WORD OF AN ITEM THE ARRAY IS TO BE SORTED. IF ABSENT, THE ARRAY WILL BE SORTED ON THE FIRST WORD (I=1).

REMARKS
THIS ROUTINE IS INEFFICIENT IF M .GT. 10.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF SHIFT
OTHERS
MOVECM - MOVE AN ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 141B

AUTHOR
C FLINK - KPS NWL
ALBAN P GASS - NWL
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/10/71

DATE(S) REVISED
03/10/74 - APG - CHANGE FROM REAL TO INTEGER
06/09/76 - DVS - CHANGE SUBROUTINE SENT TO MOVLEV
02/21/80 - DVS - CHANGE SUBROUTINE MOVLEV TO MOVECM

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'SSORTL'

PURPOSE
   FTN-CALLABLE LOGICAL SHELL SORT FOR CHARACTER ARRAYS

FUNCTIONAL CATEGORIES: M1

USAGE
   CALL SSORTL (A, I, M, T)
   CALL SSORTL (A, I, M)

DESCRIPTION OF PARAMETERS
   A - CHARACTER ARRAY TO BE SORTED
   I - NUMBER OF ELEMENTS IN ARRAY 'A' TO BE SORTED
   M - MASK WORD WITH THE RELEVANT BITS SET
   T - IF PRESENT, ASSOCIATED ARRAY, RE-ORDERED SUCH THAT
       A(K) STILL RELATES TO T(K)

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
      SHIFT
   OTHERS
      EQU60

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 114B

AUTHOR
   C FLINK - KPS NWL

DATE WRITTEN: 12/03/70

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

FUNCTION 'SUMIT'

PURPOSE
SUM ELEMENTS OF REAL ARRAY

FUNCTIONAL CATEGORIES: A1

LANGUAGE: FORTRAN IV

REMARKS
NONE

USAGE
ITOTAL = SUMIT (ARRAY, N)

DESCRIPTION OF PARAMETERS
SUMIT - WILL CONTAIN ARRAY(1)+ARRAY(2)+...+ARRAY(N)
ARRAY - ARRAY TO BE SUMMED
N - NUMBER OF ELEMENTS OF ARRAY TO BE SUMMED

CM REQUIRED: 16B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/23/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'SWAP'

PURPOSE
   SWAP TWO ARRAYS

FUNCTIONAL CATEGORIES: K2

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
   CDC 6000
   BURROUGHS B7700

REMARKS
   NONE

USAGE
   CALL SWAP (A, B, NWORDS)

DESCRIPTION OF PARAMETERS
   A,B   - ARRAYS TO BE SWAPPED (REAL OR INTEGER ON B7700)
   NWORDS   - NUMBER OF WORDS TO BE SWAPPED

CM REQUIRED: B7700: 136 WORDS
             CDC : 16B WORDS

EXAMPLE

```
         PROGRAM TEST (OUTPUT=128)
         INTEGER A(10), B(10)
         DATA A/ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10/
         DATA B/ 10, 9, 8, 7, 6, 5, 4, 3, 2, 1/
         ...
         CALL SWAP (A, B, 10)
   C     ARRAY A NOW CONTAINS 10, 9, 8, 7, 6, 5, 4, 3, 2, 1
   C     ARRAY B NOW CONTAINS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
         ...
```

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/12/80

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'TIMLEFT'

PURPOSE
DETERMINE CP (AND IO) TIME LEFT SINCE START OF BATCH JOB
OR INTERCOM COMMAND

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL TIMLEFT (CP, XIO)
CALL TIMLEFT (CP)

DESCRIPTION OF PARAMETERS
CP - WILL CONTAIN CP TIME REMAINING
XIO - IF PRESENT, WILL CONTAIN IO TIME REMAINING
(IF NEGATIVE, THE SYSTEM IS NOT TESTING IO TIME.
THE TOTAL IO TIME USED IS ABS(XIO).)

CM REQUIRED: 65B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND FLOAT SHIFT
OTHERS
RCPA - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
R65FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/27/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'TRAILBZ'

PURPOSE
   CHANGE TRAILING BLANKS TO ZEROS (00B)

FUNCTIONAL CATEGORIES: M4

USAGE
   CALL TRAILBZ (A, N)
   CALL TRAILBZ (A, N, NW)
   CALL TRAILBZ (A, N, NW, NC)

DESCRIPTION OF PARAMETERS
   A - ARRAY TO BE PROCESSED
   N - NUMBER OF WORDS OF 'A' TO BE PROCESSED
   NW - NUMBER OF LAST NON-BLANK WORD OF 'A'
        (0 LE NW LE N)
        (NW=0 MEANS ALL OF 'A' IS BLANK)
   NC - POSITION OF LAST NON-BLANK CHARACTER OF A(NW)
        (0 LE NC LE 10)
        (NC=0 MEANS ALL OF 'A' IS BLANK)

REMARKS
   00B IS TREATED AS A BLANK.

   THIS SUBROUTINE IS USEFUL WHEN GENERATING MESSAGES FOR
   PRINTING IN THE DAYFILE USING 'CALL REMARK'. AFTER
   A MESSAGE IS GENERATED WITH AN ENCODE, A CALL TO 'TRAILBZ'
   WILL REMOVE ANY TRAILING BLANKS. THIS WILL RESULT IN
   THE SHORTEST POSSIBLE MESSAGE. THIS IS PARTICULARLY
   DESIRABLE FOR PROGRAMS WHICH ARE RUN FROM TELETYPE,
   SINCE TRAILING BLANKS ARE NOT SUPPRESSED FOR DAYFILE
   MESSAGES.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
      MASK
      SHIFT

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 122B

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 04/08/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      TAPE LABELLED   CSYSNSRDCPL: P.F. NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

FUNCTION 'UNHEX3'

PURPOSE
SPREAD 2 CHARACTERS INTO 3 HEX DIGITS

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
'UNHEX3' IS AN INTEGER FUNCTION.

WRITTEN TO CHANGE 2-CHARACTER INTERNAL TERMINAL ID INTO
3-CHARACTER (HEX) TERMINAL ID

USAGE
I = UNHEX3 (INTTID)

DESCRIPTION OF PARAMETERS
INTTID - INPUT INTERNAL TID (E.G., 2L@D)
UNHEX3 - OUTPUT IN FIRST 3 CHARACTERS (E.G., 3LF04)

CM REQUIRED: 43B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND OR SHIFT
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 09/19/78

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'UNLOAD'

PURPOSE
   UNLOAD A FORTRAN FILE

FUNCTIONAL CATEGORIES: Q3

USAGE
   CALL UNLOAD (IOUNIT)

DESCRIPTION OF PARAMETER
   IOUNIT - FORTRAN LOGICAL UNIT NUMBER

REMARKS
   THE FILE TO BE UNLOADED MUST BE LISTED IN THE FORTRAN
   PROGRAM STATEMENT. FOR NON-STANDARD FILES, SEE 'CLUNLD'.

   FORTRAN SEQUENTIAL FILES SHOULD HAVE THEIR BUFFERS FLUSHED
   BY ISSUING A REWIND BEFORE CALLING THIS ROUTINE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      CLUXXX - UNLOAD A FILE

LANGUAGE: FORTRAN IV EXTENDED

CM REQUIRED: 216

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/07/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

FUNCTION 'VALDAT'

PURPOSE
LOGICAL FUNCTION TO VALIDATE A DATE FORMAT

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
'VALDAT' MUST BE DECLARED LOGICAL IN THE CALLING PROGRAM.

UPON RETURN, IF THE FORMAT WAS VALID, THE DATE IS RETURNED AS ' MM/DD/YY '.

USAGE
VALDAT (DATE)

DESCRIPTION OF PARAMETERS
DATE - DATE TO BE ANALYZED
(IF FORMAT OK, RETURNED AS ' MM/DD/YY ')
VALDAT - WILL CONTAIN
.TRUE. - DATE FORMAT WAS OK
.FALSE. - DATE FORMAT WAS NOT OK

CM REQUIRED: 162B

METHOD
DATE FORMAT IS VALIDATED BY THE FOLLOWING CHECKS:
EXACTLY 2 SLASHES
SLASHES SEPARATED BY 1 OR 2 CHARACTERS
SLASHES NOT IN POSITIONS 1, 9 OR 10
MONTH CONTAINS 1 OR 2 DIGITS (LEADING BLANKS OK)
DAY CONTAINS 1 OR 2 DIGITS (LEADING BLANKS OK)
YEAR CONTAINS 2 DIGITS
VALDAT RETURNS IF ANY CHECK FAILS.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND OR SHIFT
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 07/26/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'VALIDT'

PURPOSE
VALIDATE ARRAY 'A' TO SEE THAT EACH ELEMENT IS ONE OF THOSE OF ARRAY 'V'

FUNCTIONAL CATEGORIES: M5

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL VALIDT (A, NA, V, NV, VALID)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE VALIDATED
NA - NUMBER OF ELEMENTS OF 'A' TO BE TESTED
V - ARRAY OF VALID ELEMENTS
NV - NUMBER OF ELEMENTS IN 'V'
VALID - LOGICAL OUTPUT CODE
TRUE - ALL ELEMENTS OF 'A' ARE VALID
FALSE - AT LEAST 1 ELEMENT OF 'A' IS INVALID

CM REQUIRED: 54B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/72

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'VFILL'

PURPOSE
   FILL AN ARRAY WITH USER-SPECIFIED WORD

FUNCTIONAL CATEGORIES: M4

LANGUAGE: CDC 6000 COMPASS
          B7700 FORTRAN IV

COMPUTERS: BURROUGHS B7700
           CDC 6000

REMARKS
   NONE

USAGE
   CALL VFILL (WORD, A, NA)

DESCRIPTION OF PARAMETERS
   WORD - WORD TO BE PUT INTO ARRAY 'A'
   A   - ARRAY TO RECEIVE 'WORD'
   NA   - NUMBER OF WORDS IN 'A' TO BE SET TO 'WORD'

CM REQUIRED: ?B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

AUTHOR
   C FLINK - KPS NWL

DATE WRITTEN: 02/10/71

DATE(S) REVISED
   ??/??/74 - DAVID V SOMMER - DTNSRDC CODE 1892.2
              (NAME CHANGED FROM 'MOVE' TO 'VFILL')
   05/01/79 - MOVE TO BURROUGHS B7700
              (CHANGE TO FORTRAN - DVS)

LOCATION OF DECKS
   SOURCE
      B7700: *SOURCE/NSRDC/VFILL
      CDC : UPDATE LIBRARY: NSRDCPL, ID=CSYS
   OBJECT
      B7700: *NSRDC/VFILL
      CDC : EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'WARNING'

PURPOSE
FTN-CALLABLE 'WARNING' CONTROL CARD

FUNCTIONAL CATEGORIES: O1

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

REMARKS
NONE

USAGE
CALL WARNING (BANNER, OUTFILE)

DESCRIPTION OF PARAMETERS
BANNER - BANNER REQUEST. ONE OF:

"FOUO"	- FOR OFFICIAL USE ONLY
"OFFICIAL"	- FOR OFFICIAL USE ONLY
"PRIVACY"	- PERSONAL DATA PRIVACY ACT OF 1974
"CONFIDENTIAL"	- CONFIDENTIAL
"SECRET"	- SECRET

NOTE: ONLY THE FIRST 7 CHARACTERS ARE TESTED.
OUTFILE - FORTRAN LOGICAL UNIT NUMBER OF THE OUTPUT FILE

CM REQUIRED: 1735B

OUTPUT DESCRIPTION
ONE BANNER PAGE WITH THE REQUESTED BANNER.

OUTPUT UNITS

UNIT #	LFN	USE
USER SPECIFIES		LISTABLE OUTPUT

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   L71FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 09/19/79

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'WEKDAY'

PURPOSE
DETERMINE THE DAY OF THE WEEK FOR ANY GREGORIAN DATE FROM OCTOBER 15, 1582 THRU FEBRUARY 28, 4000

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV

COMPUTERS: BURROUGHS B7700, CDC 6000

REMARKS
DATES FROM JANUARY 1, 1582 THRU OCTOBER 14, 1582 AND AFTER FEBRUARY 28, 4000 THRU DECEMBER 31, 4000 ARE NOT VALIDATED.

USAGE
CALL WEKDAY (IERR, IDAY, IGY, IGM, IGD)

DESCRIPTION OF PARAMETERS
IERR - RETURN CODE
0 - NO ERROR
1 - AT LEAST ONE OF IGY, IGM, IGD OUT OF RANGE
IDAY - WILL CONTAIN DAY-OF-WEEK
0 (SUNDAY) THRU 6 (SATURDAY)
IGY - GREGORIAN YEAR (EG, 1975)
IGM - GREGORIAN MONTH (1-12)
IGD - GREGORIAN DAY (1-31)

CM REQUIRED: EST 123 WORDS (B7700); 102B (CDC)

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MOD
OTHERS
NONE

METHOD
SEE IBM PROGRAM DESCRIPTION 360D 03.1.004

AUTHOR
RICHARD CONNER - IBM

DATE WRITTEN: 10/15/66

DATE(S) REVISED
04/26/73 - REWRITTEN IN FORTRAN FOR CDC 6000 - DVS
04/25/79 - IMPLEMENTED ON BURROUGHS B7700 - DVS

LOCATION OF DECKS
SOURCE
B7700: *SOURCE/NSRDC/WEKDAY
CDC : UPDATE LIBRARY: NSRDCPL.UD=CSYS
OBJECT
B7700: *NSRDC/WEKDAY
CDC : EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ZBLANK'

PURPOSE
CHANGE BLANKS TO 00B AND VICE VERSA

FUNCTIONAL CATEGORIES: M4

USAGE
CALL ZBLANK (A, NA)

DESCRIPTION OF PARAMETERS
A - START OF AREA TO BE PROCESSED
NA - NUMBER OF WORDS TO BE PROCESSED

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 46B

AUTHOR
J. P. - KPS - NWL

DATE WRITTEN: 1973

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ZEROFL'

PURPOSE
ZERO FIELD LENGTH (SECURITY EOJ)

FUNCTIONAL CATEGORIES: M4

USAGE
CALL ZEROFL

REMARKS
'ZEROFL' ZEROS THE JOB'S FIELD LENGTH ABOVE 77B AND ENDS THE JOB WITHOUT DAYFILE MESSAGES.

THE INTENDED USE IS AS THE TERMINATION ROUTINE, CALLED BY REPRIEVE, WHENEVER A UTILITY PROGRAM HAS WITHIN ITS FIELD LENGTH DATA THAT SHOULD NOT APPEAR IN A USER'S DUMP.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 21B

AUTHOR
C FLINK - KP NWL

DATE WRITTEN: 08/73

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ZEROS'
SUBROUTINE 'ZEROES'

PURPOSE
   REPLACE BLANKS WITH (DISPLAY CODE) ZEROS, MULTIPLE FIELDS

FUNCTIONAL CATEGORIES: M4

USAGE
   CALL ZEROS (A, S1, L1, S2, L2, ..., SN, LN)
   CALL ZEROES (A, S1, L1, S2, L2, ..., SN, LN)

DESCRIPTION OF PARAMETERS
   A - ARRAY TO BE PROCESSED
   S - STARTING BYTE OF A FIELD
       (BYTE COUNT BEGINS WITH 1 FOR THE LEFTMOST BYTE IN 'A')
   L - NUMBER OF BYTES IN THIS FIELD TO PROCESS

       (UP TO 31 PAIRS OF SI,LI)

REMARKS
   'ZEROS' WILL REPLACE BLANKS WITH ZEROS UP TO THE 1ST
   NON-BLANK CHARACTER IN A GIVEN FIELD.
   IF THE 1ST NON-BLANK CHARACTER IS MINUS (-), THEN THAT
   CHARACTER POSITION IS REPLACES WITH A ZERO AND THE 1ST
   CHARACTER IN THE FIELD IS REPACED WITH A MINUS (-).

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 55B

AUTHOR
   T HERRING - KPS NWL

DATE WRITTEN: 12/09/70

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ZPFPUT'

PURPOSE
PUT USER-SPECIFIED PARAMETERS INTO ARRAY FOR LATER CALL TO ZPFUNC

FUNCTIONAL CATEGORIES: Q3

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

USAGE
```
CALL ZPFPUT (IPRMS, NW)
CALL ZPFPUT (IPRMS, NW, LFN, PFN, ID, TK, RD, EX, MD, CN,
             MR, AC, CY, RP, XR, LC, RW, SN, VSN, FO, ST,
             UV, RB)

FOR EXAMPLE:
CALL ZPFPUT (IPRMS,  0)
CALL ZPFPUT (IPRMS,  1, LFN)
CALL ZPFPUT (IPRMS,  5, LFN, PFN)
CALL ZPFPUT (IPRMS,  6, LFN, PFN, ID)
   ...
CALL ZPFPUT (IPRMS, 13, LFN, PFN, ID, TK, RD, EX, MD, CN,
             MR, AC)
   ...
CALL ZPFPUT (IPRMS, 24, LFN, PFN, ID, TK, RD, EX, MD, CN,
             MR, AC, CY, RP, XR, LC, RW, SN, VSN, FO, ST,
             UV, RB)
```

DESCRIPTION OF PARAMETERS

IPRMS	- ARRAY (MAXIMUM REQUIRED DIMENSION 24) TO BE DEFINED
NW	- 0 - SET ALL 24 WORDS TO ZERO 1 THRU 24 - DEFINE NW PARAMETERS FROM THE FOLLOWING
LFN	- LOCAL FILE NAME (1-7 CHARACTERS)
PFN	- 4-WORD PERMANENT FILE NAME
ID	- 1-9 CHARACTERS
TK	- TURNKEY PASSWORD (1-9 CHARACTERS)
RD	- READ PASSWORD (1-9 CHARACTERS)
EX	- EXTEND PASSWORD (1-9 CHARACTERS)
MD	- MODIFY PASSWORD (1-9 CHARACTERS)
CN	- CONTROL PASSWORD (1-9 CHARACTERS)

```
   MR     - MULTIPLE-READ (0 OR NOT)
   AC     - ACCOUNT NUMBER (10 CHARACTERS, LAST IS NUMERIC)
   CY     - CYCLE (INTEGER -999 TO -1, 1 TO 999)
   RP     - RETENTION PERIOD (0-999)
   XR     - READ-ONLY PASSWORD (1-9 CHARACTERS)
   LC     - LOWEST CYCLE (0 OR NOT)
   RW     - MULTI-READ, SINGLE WRITE (0 OR NOT)
   SN     - SETNAME (1-7 CHARACTERS)
   VSN    - VOLUME SERIAL NUMBER (1-6 CHARACTERS,
            LEFT-JUSTIFIED).  RESERVED FOR FUTURE.
   FO     - FILE ORGANIZATION (2-CHARACTERS)
   ST     - STATION ID (MULTI-FRAME)
            RESERVED FOR FUTURE.
   UV     - UNIVERSAL PASSWORD (1-9 CHARACTERS)
   RB     - PURGE RB CONFLICTS (0 OR NOT)

   NOTE: ALL VARIABLES ARE TYPE INTEGER.  CHARACTER DATA IS
         LEFT-JUSTIFIED AND MAY BE ZERO- OR BLANK-PADDED.
         TO CLEAR (OR OMIT) A SPECIFIC PARAMETER, USE 0.

CM REQUIRED: 144B

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MINO
   OTHERS
      NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 01/13/76

DATE(S) REVISED
   01/20/76
   09/23/80 - UPGRADE TO LEVEL 508 (UV AND RB ADDED)

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

SUBROUTINE 'ZPFUNC'

PURPOSE
CALLABLE PERMANENT FILE FUNCTIONS

FUNCTIONAL CATEGORIES: Q3

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

USAGE
CALL ZPFUNC (IRC, IPRMS, NW)

DESCRIPTION OF PARAMETERS
IRC - INPUT: PERMANENT FILE FUNCTION DESIRED
1 - ATTACH (10B)
2 - CATALOG (20B)
3 - EXTEND (30B)
4 - PURGE (40B)
5 - RENAME (50B)
6 - PERM (60B)
24 - ALTER
IF THE VALUE IN PARENTHESES IS USED, THE 2- OR 3-LINE SYSTEM MESSAGE WILL APPEAR IN THE DAYFILE.

OUTPUT: ERROR RETURN CODE
(EITHER ZPFUNC- OR NOS/BE-GENERATED)

ZPFUNC-GENERATED

IRC	MEANING
-1	IRC HAD ILLEGAL INPUT VALUE
-2	LAST CHARACTER OF AC IS NOT DISPLAY CODE NUMERIC

NOS/BE-GENERATED: SEE NEXT PAGE

NOS/BE-GENERATED

DEC	OCT	COMND	MEANING
0	000	ALL	FUNCTION SUCCESSFUL
1	001		PFN/ID ERROR
2	002	A,P	LFN ALREADY IN USE
3	003	CEPR	UNKNOWN LFN
4	004	C	TOO MANY CYCLES (5 MAX)
5	005	C,E	PF CATALOG FULL
6	006		NO LFN OR PFN
8	010	C,E	LATEST INDEX NOT WRITTEN
9	011	C	FILE NOT ON A PF DEVICE
10	012	A	FILE NOT CATALOGED, SN=<SETNAME>
11	013	A	ARCHIVE RETRIEVAL ABORTED
12	014	C,R	BAD LPF COMMUNICATION
13	015	C	CY LIMIT REACHED (999 MAX)
14	016	C	PF DIRECTORY FULL
15	017	CEPR	FUNCTION ATTEMPTED ON A NON-PERMANENT FILE
16	020		FCN ATTEMPTED ON NON-LOCAL FILE
17	021	A	IMPROPER ARCHIVE RETRIEVAL CALL
18	022	C	FILE NEVER ASSIGN TO A DEVICE
19	023	A	CYCLE INCOMPLETE OR DUMPED
20	024	A	FILE ALREADY ATTACHED
21	025	A	FILE ARCHIVED
22	026		ILLEGAL CHARACTER IN FDB PARAM
23	027		ILLEGAL LFN
24	030	A	FILE DUMPED
25	031		ILLEGAL FUNCTION CODE
26	032	P	PURGE ATTEMPT IGNORED; USE RB PARAMETER
27	033		ALTER NEEDS EXCLUSIVE ACCESS
28	034		FDB IS TOO LARGE
29	035	C	FILE ALREADY IN SYSTEM
30	036	A	NO APF SPACE
31	037		PERMISSION CONFLICTS
32	040		ILLEGAL SETNAME SPECIFIED
33	041		DEVICE NOT MOUNTED AT CTL POINT
34	042		RBT CHAIN TOO LARGE FOR PFC
35	043	A,P	FILE RESIDES ON UNAVAILABLE DEVICE
36	044	A,P	FILE NOT AVAILABLE
56	070		PFM STOPPED BY SYSTEM
* 57	071		INCORRECT PERMISSION
* 58	072		FILE DEFINITION BLOCK ADDRESS INVALID (NOT RETURNED TO FDB)
* 59	073		I/O ERROR ON PFD/PFC READ/WRITE

* - ALWAYS CAUSES ABNORMAL JOB TERMINATION

IPRMS - PARAMETERS FOR PF FUNCTION
(UNUSED FIELDS MUST BE SET TO ZERO)

IPRMS	CONTENTS	FUNCTIONS	FORMAT
1	LFN	ALL	1-7 CHAR, LEFT* (IF 0, 1ST 7 CHAR OF PFN ARE USED (A,C,P)
2-5	PFN	A,C,P,R	1-40 CHAR, LEFT
6	ID	A,C,P,R	1-9 CHAR, LEFT
7	TK	**,***	1-9 CHAR, LEFT
8	RD	**,***	1-9 CHAR, LEFT
9	EX	**,***	1-9 CHAR, LEFT
10	MD	**,***	1-9 CHAR, LEFT
11	CN	**,***	1-9 CHAR, LEFT
12	MR	A,C	0 OR NOT
13	AC	C,R****	10 CHAR (LAST 3 NUMERIC)
14	CY	A,C,P,R	INTEGER (1-999) NEGATIVE TO RETURN VALUE
15	RP	C,R	INTEGER (0-999)
16	XR	C,R ***	1-9 CHAR, LEFT
17	LC	A,P	0 OR NOT
18	RW	A,C	0 OR NOT
19	SN	A,P	1-7 CHAR, LEFT
20	VSN		VOLUME SERIAL NUMBER (RESERVED FOR FUTURE)
21	FO	C	2-CHAR, LEFT (DA, IS, AK)
22	ST		STATION ID (MULTI-FRAME) (RESERVED FOR FUTURE)
23	UV	A,P	1-9 CHAR, LEFT
24	RB	P	0 OR NOT

A=ATTACH; C=CATALOG; P=PURGE; R=RENAME

* LEFT=LEFT-JUSTIFIED, BLANK OR ZERO PADDED
** FOR A,P, INTERPRETED AS SUBMITTED PASSWORD
FOR C, USED AS BOTH DEFINITION AND SUBMITTED PW
*** FOR R, WHEN SET TO 1, THE PASSWORD IS CLEARED
**** FOR C, WHEN OMITTED, AC IS TAKEN FROM CHARGE CARD OR LOGIN

NW - NUMBER OF LAST FILLED ELEMENT IN IPRMS (OPTIONAL)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND   SHIFT
   OTHERS
      IZPFBTZ
      IZRT9ZR
      NUMVAR
      ZPFMAC
      ZPFPSW

CM REQUIRED: 423B

AUTHOR
   C M CHERNICK - DTNSRDC CODE 1832

DATE WRITTEN: 01/75

DATE(S) REVISED
   05/75   01/02/76
   09/23/80 - DVS - UPGRADE TO LEVEL 508 (ADD UV AND RB)

LANGUAGE: FORTRAN IV EXTENDED

FUNCTIONAL CATEGORIES: Q3

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

EXAMPLE

```
      PROGRAM TEST (INPUT, OUTPUT,
     A             TAPE5=INPUT, TAPE6=OUTPUT)
      DIMENSION IPRMS(13)
      DATA LFN   / 6LMYFILE/
      DATA ID    / 4LXXXX/
      DATA IPFN1, IPFN2/ 10HPERMANENTF, 3LILE/
      DATA IAC   / 10H9876543210/          << SEE NOTE BELOW
      DATA IPW   / 8LPASSWORD/

         . . .

      DO 10 I=1,13
   10 IPRMS(I) = 0
      IPRMS( 1) = LFN
      IPRMS( 2) = IPFN1
      IPRMS( 3) = IPFN2
      IPRMS( 6) = ID
      IPRMS( 7) = IPW
      IPRMS(13) = IAC                      << SEE NOTE BELOW
      IRC = 2
      CALL ZPFUNC (IRC, IPRMS, 13)
      IF (IRC .NE. 0) WRITE (6, 20) IRC, IRC
   20 FORMAT ("0ERROR - IRC=', O3, "B = ", I7)

         . . .

      STOP
      END
```

THIS PROGRAM IS EQUIVALENT IN EFFECT TO THE FOLLOWING CONTROL CARDS:

```
   CATALOG(MYFILE,PERMANENTFILE,ID=XXXX,AC=9876543210,
           PW=PASSWORD)
```

FOR A NEW CYCLE OF AN EXISTING FILE; OR

```
   CATALOG(MYFILE,PERMANENTFILE,ID=XXXX,AC=9876543210,
           TK=PASSWORD)
```

FOR THE CREATION OF A NEW FILE.

NOTE: IF THESE TWO LINES ARE OMITTED (THAT IS, AC IS ZERO), AC WILL BE TAKEN FROM THE BATCH CHARGE CARD OR THE INTERCOM LOGIN.

SUBROUTINE 'ZRTPUT'

PURPOSE
PUT USER-SPECIFIED PARAMETERS INTO ARRAY FOR LATER CALL TO ROUTE

FUNCTIONAL CATEGORIES: Q0

USAGE

```
CALL ZRTPUT (IPRMS, NW)
CALL ZRTPUT (IPRMS, NW, LFN, DC, TID, FID, DEF, RETJOB, FC,
             EC, IC, STID, PRI, REP)

FOR EXAMPLE:
CALL ZRTPUT (IPRMS, 0)
CALL ZRTPUT (IPRMS, 1, LFN)
CALL ZRTPUT (IPRMS, 2, LFN, DC)
   ...
CALL ZRTPUT (IPRMS, 13, LFN, DC, TID, FID, DEF, RETJOB, FC,
             EC, IC, STID, PRI, REP, NCD)
```

DESCRIPTION OF PARAMETERS

```
IPRMS  - ARRAY (MAXIMUM REQUIRED DIMENSION 13) TO BE DEFINED
NW     - 0 - SET ALL 13 WORDS TO ZERO
         1 THRU 12 - DEFINE NW PARAMETERS FROM THE FOLLOWING
LFN    - LOCAL FILE NAME (1-7 CHARACTERS)
DC     - DISPOSITION CODE (2 CHARACTERS)
TID    - TERMINAL IDENTIFICATION
         1LC - CENTRAL SITE
         2-CHARACTER TERMINAL ID
         4LHERE - ROUTE TO THIS TERMINAL
FID    - FILE IDENTIFICATION
         1L*  -OR-
         1-5 CHARACTER FILE ID, PRECEDED BY *
DEF    - 3LDEF - DEFER ROUTE UNTIL END OF JOB
RETJOB - NON-ZERO TO RETURN JOB NAME IN THIS WORD
FC     - FORMS CODE (2 CHARACTERS)
EC     - EXTERNAL CHARACTERISTICS
         FOR PRINT:
            2LB4, 2LB6, 2LA6, 2LA9
         FOR PUNCH:
            2LSB, 5L80COL, 3L026, 3L029, 5LASCII
IC     - INTERNAL CHARACTERISTICS
         0 OR 3LDIS - DISPLAY CODE
         5LASCII    - ASCII
         3LBIN      - BINARY
STID   - 3-CHARACTER STATION ID
PRI    - PRIORITY (TO ROUTING TERMINAL ONLY)
         (0000B-7777B)
         ALL OTHERS USE 0
REP    - REPEAT COUNT (0-31 (37B))
NCD    - 0  -OR-
         1 - NO COMPLEMENTARY DAYFILE
             (VALID ONLY IF IPRMS(5)=3LDEF)
```

NOTE: ALL VARIABLES ARE TYPE INTEGER. CHARACTER DATA IS LEFT-JUSTIFIED AND ZERO-PADDED.
TO CLEAR (OR OMIT) A SPECIFIC PARAMETER, USE 0.

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MINO   MOVLEV
   OTHERS
      NONE

LANGUAGE: FORTRAN IV EXTENDED

CM REQUIRED: 102B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 01/19/76

DATE(S) REVISED
   01/24/77 - ADD REP PARAMETER
   11/30/77 - ADD NCD PARAMETER

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'ZSYSEQ'

PURPOSE
FORTRAN CALLABLE SYSTEM CALL

FUNCTIONAL CATEGORIES: Q3

USAGE
CALL ZSYSEQ (I)

DESCRIPTION OF PARAMETER
I - THE CONTENTS OF I ARE PUT INTO X6 BEFORE THE SYSTEM IS CALLED

EXAMPLE
CALL SYSTEM ROUTINE DSP WITH PARAMETERS CONTAINED IN 'A':

```
CALL ZSYSEQ (4LDSPP .OR. LOCF(A))
```

NOTE: THE P AFTER DSP IS THE RECALL BIT. IF NO RECALL REQUIRED, THEN:

```
CALL ZSYSEQ (3LDSP .OR. LOCF(A))
```

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
SYS=

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 4B

AUTHOR
C M CHERNICK - DTNSRDC CODE 1832

DATE WRITTEN: 04/07/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

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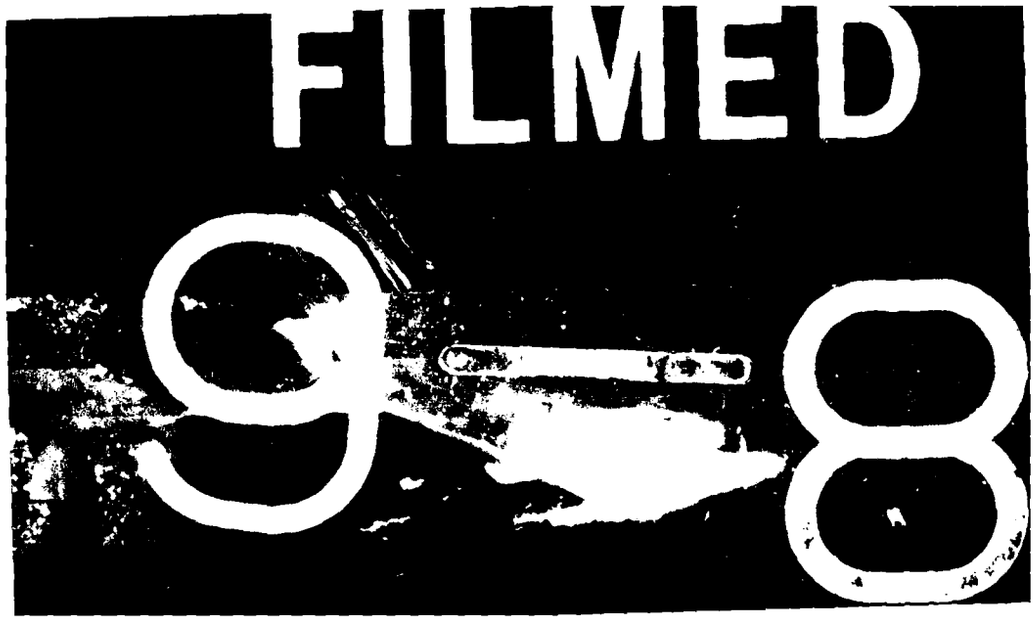
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